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## **What are the challenges that faces the egg in the next decade?**

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There has been a strong consumer demand to take welfare into account in animal production, including table eggs. This is particularly true in Europe and North America but increasingly around the world. We review the main demands that are facing the egg industry driven by economic, societal and sustainability goals. We describe solutions already delivered by research and those that will be needed for the future. Already table egg consumption patterns have seen a major shift from cage to non-cage production systems because of societal pressures. These often feature free range and organic production. These changes likely signal the future direction for the layer sector with the acceleration of the conversion of cage to barn and aviary systems with outdoor access. This can come with unintended consequences from bone fracture to increased disease exposure, all requiring solutions. In the near future, the laying period of hens will be routinely extended to improve the economics and environmental footprint of production. Many flocks already produce close to 500 eggs per hens in a lifetime, reducing the number of replacement layers and improving the economics and sustainability. It will be a challenge for scientists to optimise the genetics and the production systems to maintain the health of these hens. A major ethical issue for the egg industry is the culling of male day-old chicks of layer breeds as the meat of the males cannot be easily marketed. Much research has and will be devoted to alternatives. Another solution is elimination of male embryos prior to hatching by in ovo sexing approaches. The race to find a sustainable solution to early stage sex determination is on. Methods based on sex chromosomes, sexually dimorphic compounds and spectral properties of eggs containing male or female embryos, are being researched and are reviewed in this article. Other proposed solutions include the use of dual-purpose strains, where the males are bred to produce meat and the females to produce eggs. The dual-purpose strains are less efficient and do not compete economically in the meat or egg market, however, as consumer awareness increases viable markets are emerging. These priorities are the response to economic, environmental, ethical and consumer pressures that are already having a strong impact on the egg industry. They will continue to evolve in the next decade and if supported by a strong research and development effort, a more efficient and ethical egg laying industry should emerge.