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January 15, 2025

Implementation of True Cost of Food Accounting in selected Swiss Agricultural Value Chains: The Case of Eggs

Consumption Trends in Switzerland and abroad

In 2023, the Swiss consumed a total of 1701 million eggs of which 1079 million were produced in Switzerland. It amounts to almost 190 eggs per person or 12 kg/capita/per year, which is a bit lower than average in OECD countries (16kg/capita). The top egg consumers worldwide are Mexico, China, Japan and the Netherland (around 20kg/capita).

Although domestic egg production has increased in Switzerland by around 35% over the past ten years, additional imports are needed to meet demand, especially in periods of high consumption before Easter and Christmas. After a long period of growth Swiss-based egg production decreased in 2023 by 3.7% mainly in response to production restriction measures designed to maintain market stability. Since demand remained unabated, this resulted in an increase in imports. Egg planning is normally 540 days in advance, so the market cannot react at short notice. The current self-sufficiency rate of egg production in Switzerland amounts to 68.6%. The share of domestic eggs that went into processed eggs and egg products currently has increased to 38% mainly due to market relief measures (including government support for cracked eggs).

Supply of Swiss eggs by category

While production of barn eggs recorded the sharpest decline in 2023 (-30.7%) the production of free-range eggs fell by only by 4.1 percent compared to the previous year¹. Swiss production of organic eggs also fell in 2023 for the first time since 2014 (-3.6%) but continues to have a share of roughly 19%. The relatively high share of direct sales from the farm of 26% is due to the many small self-suppliers with backyard flocks.

Demand of Swiss eggs by category

Retail sales of eggs produced in Switzerland decreased by 5% in 2023 while prices increased by 5%. This is largely the result of the reduction in the sales of barn eggs (17.1%) but also organic eggs (-8.6%). In return, the sales of free-range eggs increased by 5.9%².

Margins in the value chain

The wide margins on the Swiss egg value chain are reflected in the large gap between the farm gate price and retail price. Whereas farmers and

Eggs and Hens

<https://www.aviforum.ch/>

Currently about 3.9 million hens live on roughly 12'900 Swiss farms, of which 800 are large professional farms that keep more than 500 chickens. The maximum size that is legally permitted on a farm are 18000 chickens. Such a limit only exists in Switzerland. Egg-laying hens are kept according to the strictest on-farm animal welfare standards in Europe. However, their lifespan is determined by economic rather than natural criteria. They have the highest economic value during Eastern when demand for fresh eggs peaks. As a result, producers ensure that hens are in best shape in the weeks before Eastern. Afterwards sales decline and the value of hens as well as their eggs decreases. Birds are usually raised up to 24 months before slaughtering. The meat of the slaughtered hens is sold as boilers or as ingredients for sausages. Consumer demand determines what ends up as secondary food products and what goes into biodigesters for energy production.



¹ Eggs are generally regarded as free-range if they come from producers not only complying with animal welfare legislation but also fulfilling the requirements for regular access to outdoor areas (RAUS) specified in the Swiss Direct Payment Ordinance (DPO, SR 910.13).

² Unlike in the case of barn eggs, hens producing free-range eggs are given the opportunity to roam outdoors during daylight hours in free-range systems. There is also a category called "free range/barn eggs" (no clear assignment to a production system). The number of eggs in this category rose slightly by 1 percent.

processors of eggs managed to obtain a margin of 2-4% (in the case of farmers only thanks to government subsidies for animal welfare measures), the margins obtained by the retailers amount to more than 20% (double as high as the European average).

Trade offs between environmental and animal welfare challenges

Proteins consumed by humans are largely animal based, consisting of meat, dairy products and eggs. Moreover, a large part of the production of plant-based protein sources such as soy are used for animal nutrition. This has to be taken into account in the life-cycle assessments of livestock production. Even though the environmental footprint of egg-based proteins may be considerably lower compared animal-based proteins derived from red meat and dairy products, the range of environmental footprint performance of intensive egg-producing farms may be depending to a great degree on management practices.

Environmental challenges associated with chicken farming are surface water and groundwater pollution, acidification (mainly NH3), eutrophication (N, P); airborne pollution (NH3, N2O, NO, dust, bioaerosols, etc.), desiccation (water depletion), local disturbance (odor, noise) as well as the spread of pathogens and pharmaceuticals in waters. In this context, an aviary system with an outdoor area (free range) may obtain better scores on animal welfare, but fare worse in terms of environmental impact. In addition, layer farms are capital-intensive resulting in a significant carbon footprint primarily due to direct energy inputs for housing operations assumed to account for 50% of total energy use along egg supply chains.

Emission factors may however differ dramatically from one operation to another due to differences in diets, housing systems, and management procedures (see Figure 1). In regard to each of these factors, there are technological choices that determine the environmental footprint on a layer farm.

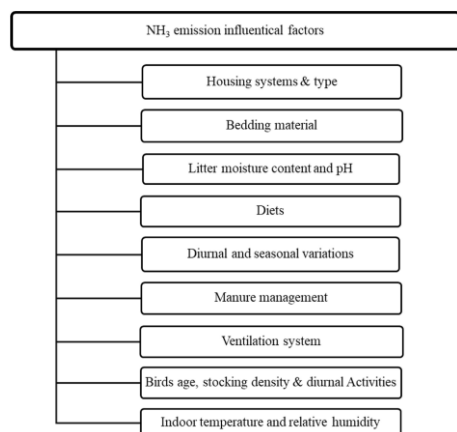


Figure 3. Key factors for NH3 emissions in layer houses (Bist et al.2023)

Perspective Gallosuisse

Interview with André Hodel (AH), CEO of Prodavi AG und Vice-President of Gallosuisse on August 19, 2024

Prodavi is part of Hobet Group, a family-owned holding company specialized on the provision of services to the Swiss poultry industry. Prodavi SA sells chicks and young hens to farms partially from its own breeding hens and hatchery and is in charge of commercializing its eggs. Gallosuisse is the Association of Swiss Egg Producers.

Question: Hobet was among the three selected candidates for the Swiss family business award. Where do you see the major strength of your company:

AH: It was our father who started the business on a smaller scale in the 1987 to serve the needs of egg producers in the region. Through continuous investments and a widening range of services, we became one of the largest players in the Swiss egg value chain. Our business aims to ensure a high degree of animal health and welfare, improve our environmental footprint and meet the highest standards of quality and transparency in egg production.



Upstream emissions:

LCA studies have assessed the diverse impacts associated with egg supply chain activities, including those associated with feed production, pullet and layer facilities, manure management, transportation and retailing. There is a general consensus that the production of feed inputs accounts for the largest share of life cycle impacts attributable to egg products. It includes the crop cultivation phase, manufacturing processes, and transportation as the main contributor to the environmental impact associated with poultry production systems.

Another significant source of upstream emissions are transportation costs. The breeding animals, known as parent animals, are imported into Switzerland as chicks on the first day. They are raised in Switzerland and then produce hatching eggs after 20 weeks. These eggs are hatched in Switzerland and sold as Swiss chicks, which are then called end products or commercials.

Alternative considerations in chicken breeding

Worldwide, there are only three notable breeding companies that control the laying hen genetics: EW Group (DE), Hendrix Genetics (NL) and Tetra Babolna (HU). Hendrix and EW share a market share of about 95% worldwide. To this day, these genetics companies focus mainly on high-performance traits in a cage environment as 90% of all layers worldwide still are held in cages. Thus, the breeding goals of genetic companies used to be almost exclusively focused on this form of production. With the banning of cage chickens and the increased concerns about animal welfare, the environment and lack of genetic diversity, the breeding focus shifted toward other traits improving robustness (disease resistance) as well as resource efficiency (feed conversion rates). While organic egg production also relies on imported hybrid chicks, some Swiss poultry producers consider a return to the use of dual-purpose animals, reared for meat as well as egg production, as a sustainable solution. They are bred on the farms themselves, with the chicks having similar characteristics as the parent animals.

Downstream emissions:

Overall, 23% of farm-gate emissions for egg production correspond to Scope 1 emissions (primarily from manure management and, to a lesser extent, on-farm combustion of fossil fuels for heating), 2% to Scope 2 (i.e. emissions from purchased energy inputs), and the majority (75%) to Scope 3 (i.e. mainly feed on the upstream side and processing, packaging, transportation, consumption and disposal on the downstream side). The environmental footprint generated by the value chain actors downstream is less documented.

Swiss regulatory environment

Based on Egg Market Ordinance issued by the federal government in 2013 (SR 910.13) egg producers are protected from strong market price fluctuations through tariff quota, as well as mark-up and mark-down campaigns for Swiss table eggs in the event of seasonal oversupply. In addition, the Swiss Federal Office of Agriculture supports layer farms that

Gallosuisse Perspective (continued)

Question: where do you see the major environmental challenges in the industry

AH: Compared to other domesticated animals, hens have a relatively low environmental footprint when only looking at the egg-producing farm. However, there are considerable emissions in the upstream part of the value chain: chicken feed represents one of the highest input costs and its import generates a large environmental footprint. We try to reduce it by sourcing as many ingredients as possible for Switzerland. In addition, we obtain our Dekalb White parent animals from Hendrix Genetics based in the Netherlands. Even though this involves emissions resulting from transportation chicken breeding companies also contribute to addressing environmental and animal welfare challenges. They apply modern genetics to not just to improve productivity of chickens but also their feed conversion rates, their resistance toward diseases as well as their suitability for the conditions in which they lay eggs. As you may now, cages for laying hens are banned in Switzerland since 1992. Yet, worldwide we are still the exception rather than the rule and hens therefore tend to be bred for a life in cages.



comply with additional animal welfare and environmental standards with programs such as particularly animal friendly stable keeping systems BTS and regular outdoor access (RAUS) as well as contributions to extensification measures (extenso) and organic production.

Economic constraints of layer farms are a sustainability challenge

As a basic food product that addresses all nutritious needs of humans, the egg has an intrinsic value for consumers, especially if there is a certain assurance that it is produced in a responsible and sustainable way. However, this would require that layer farms earn a decent living that also allows them to continuously upgrade their facilities so that they are able to ensure a high animal welfare and environmental standard.

With profit margin of less than 3% (or as little as 1% if government contributions are deducted), the deal does not add up, especially in view of the high annual monitoring and inspection costs that have to be borne by the farmer in return for government payments and certifications for labels. Ways must be found to lower these costs through better coordination and the use of digital tools.

Consequently, actors in the value chain must find an agreement on how to address animal welfare as well as social and environmental challenges in the value chain in a cost-effective and fair way so that additional costs are not simply expected to be borne by layer farms – or otherwise are simply passed on to consumers through a higher price for sustainably produced eggs.

Gallosuisse proved recently that such an approach is possible in the field of animal welfare: It has managed to develop a joint solution for phasing out chick culling that is supported by all players in the value chain. The technical facilities for the recognition of the sex of an egg in a non-invasive way will be put into operation in both large hatcheries from the beginning of 2025 and will be successively ramped up. The resulting additional costs will be shared to a degree that only half of the additional costs per egg will have to be passed on to the consumer (+1.5 cents of egg).

The problem with sustainability labels

There is merely one single sustainability label in Switzerland for which retailers are willing to pay a substantial premium price: organic eggs certified by Biosuisse³. Hens on organic layer farms have more space and improved access to outdoor areas and the number of chickens per farm is not to exceed 4000. In addition, the dependence on chicken culling and hybrid chicken is in the process of being phased by rearing the brother cockerels of the laying lines and keeping dual-purpose hens. Yet, there are also many unresolved issues because the resulting extensification of egg involves substantial costs that must be compensated.

³ In 2023 the price of a certified organic egg was 88 cents compared 62 cents for a free-range and 40 for a barn egg. The average price of imported eggs is 30 cents.

Gallosuisse Perspective (continued)

Question: How do you deal not just with the increasingly strict regulatory requirements in Switzerland but also the pressure from retailers to improve the sustainability of egg production?

AH: Retailers are eager to offer their consumers eggs that are produced in a sustainable way. But there is often a lack of understanding of the complexity of the egg value chain as well as the practicality of implementing the measures they regard as a contributing to more sustainability. Complying with labels is costly, especially due to the bureaucracy involved. Moreover, it is often not clear what the added value of additional requirements are. It is also largely ignored that almost all Swiss shell eggs follow the IP-Suisse standard since 2022. This label has been developed in collaboration with farmers to ensure that eggs come from particularly animal- and climate-friendly production methods on free-range farms. But rather than accepting solutions that have been developed in cooperation with all actors in the value chain, retailers tend to use their market power to ask for additional requirements. This is fine if they also share the burden of implementation in view of the high margin they obtain in the value chain. The sustainability labels launched by retailers tend to focus primarily on consumer concerns but tend to disregard the investments carried out by value chain actors to reduce their environmental footprint and to advance the circular economy by making use of waste to generate secondary products and biogas.



Moreover, a reduction in domestic egg productivity is likely to lead to an increase of imports of egg they may not meet similar sustainability standards. Organic certifiers also allow for many exceptions. For example, if there is a shortage of certified organic soy in Europe, it is imported from China, which surely leads to a higher carbon footprint. Moreover, there are often imbalances in the use of organic manure.

Overall, certified organic is and will remain important because it provides consumers with identity, meaning and orientation. However, it is not clear, whether organic is best suited in meeting the challenge of increasing the supply of affordable and sustainably produced eggs because the market for eggs is growing globally, and the challenge will be how to produce more eggs but in a more sustainable way and with less resources. This challenge can only be met through investments in innovation and the 'organic' label is not particularly known for innovativeness.

Capturing the true cost of Swiss eggs

Egg protein is recognized as a highly digestible and excellent source of essential amino acids, with the highest attainable protein digestibility-corrected amino acid score. Egg protein further decreases malnutrition in underdeveloped countries and possibly increases height in children. They also protect against Kwashiorkor, a disease marked by severe protein malnutrition and bilateral extremity swelling. They also prevent the development of goiters, a continuing challenge in low income iodine-deficient countries.

In addition, egg protein has been demonstrated to be important to skeletal muscle health, to protect against infection as well as to have hypotensive and anti-cancer effects. Finally, egg protein also can decrease appetite, resulting in a reduction in the caloric intake from the next meal and weight reduction.

These positive health aspects have to be balanced against the fact that eggs are animal-based proteins that tend to have a larger environmental footprint compared to plant-based proteins and face animal welfare challenges. Yet, in comparison with alternative animal-based proteins from meat and dairy, the environmental footprint is generally considered to be lowest.

Overall, it could be argued that egg consumption generates many health benefits and a relatively moderate environmental footprint.

Consequently, eggs should be more widely available at affordable prices to improve the health of the poor, especially in low-income countries. However, scaling up egg production may increase animal welfare challenges. The focus on lowering the true cost of eggs should therefore be on investment in innovations that help further lower the environmental footprint while improving animal welfare and health in the egg industry.

Gallosuisse Perspective (continued)

Question: The concept 'True Cost of Food' aims to internalize the negative environmental and social externalities generated in the production of a particular food product. While eggs have a comparatively low carbon footprint and contain many nutrients including high quality protein, vitamins and minerals, there are still many unresolved challenges, especially in terms of animal welfare and feed imports. Does Gallosuisse aim to address them?

AH: The 'True Cost of Food' concept may have to take into account to a much greater degree the trade-offs that producers face. They are committed to improve sustainability, but there also needs to be a return on investment (ROI). There should be more recognition for concrete sustainability improvement, not just by passively complying with standards, but also by adopting innovations that result in a better sustainability performance. In this context, it may be worth considering alternative ways of measuring sustainability in a more holistic way. Why not replacing or at least complementing labels with a sustainability score of each value chain actor that is able to measure and compare output performance? It may allow to move away from highly aggregated data on the overall sustainability performance of a particular food product to a more competitive approach that highlights which actors perform better than others in the production of the particular food product.



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Links:

- <https://worldpopulationreview.com/country-rankings/egg-consumption-by-country>
- <https://www.agrarmarktdaten.ch/blog/rueckgang-schweizer-eierproduktion-und-anstieg-importe>
- https://www.aviforum.ch/Portaldata/1/Resources/wissen/statistiken/de/Statistiken_2023_D_SGZ_4_2_4.pdf
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