

Fact sheet on animal husbandry in Germany: Aquaculture



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1 Trends

Aquaculture is the controlled rearing of aquatic organisms. It is becoming increasingly important worldwide, particularly against the background of rising demand for fish and seafood.

The most important trends and developments in aquaculture are summarised here:

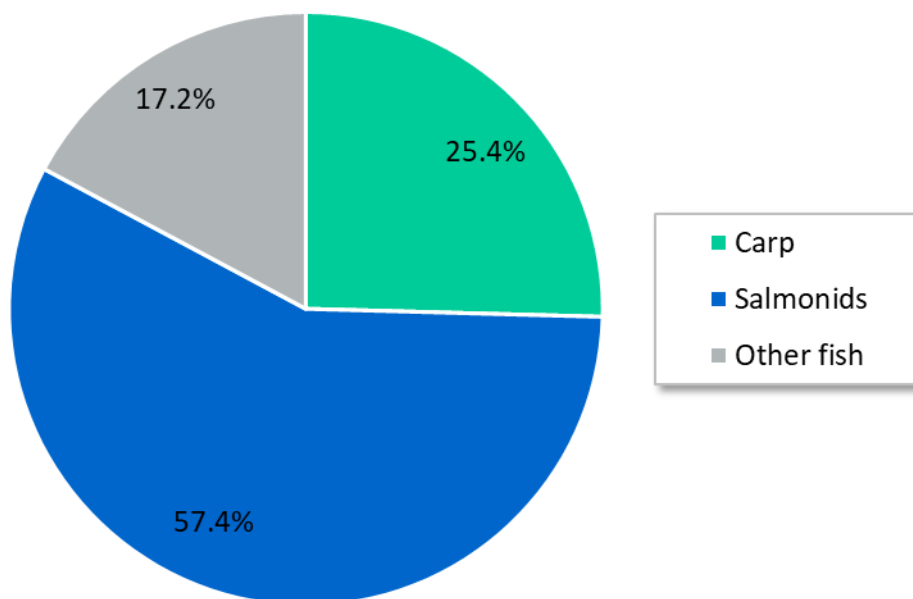
- Since 2014, the production of fish and seafood in aquaculture has overtaken fishing as a source of food supply worldwide. Fish farming is expanding in Asia and South America. In the European Union, however, production is stagnating with declining number of operations. A downward trend in fish production is also being observed in the German sector.
- Innovation and start-ups in Germany are hampered by legal requirements in construction, environmental and water law. Investors from outside the industry with strong capital often stay away from the sector.
- Aquaculture businesses breeding trout (*Oncorhynchus mykiss*) and carp (*Cyprinus carpio*) in Germany have to struggle with high losses due to predators (otters, cormorants, herons). This results not only in direct losses, but also indirect losses due to stress and injuries, which lead to reduced food intake and weakened immune systems. Predators such as starfish, crabs and seabirds (e.g., eider ducks) and the invasive expansion of the Pacific oyster (*Magallana gigas*) pose challenges for German blue mussel (*Mytilus edulis*) production.
- Climate change is also affecting aquaculture: carp pond farmers complain of water shortages, while trout pond farmers also complain of high-water temperatures and the resulting lack of oxygen in the water. Heavy rainfall events cause nutrient inputs from other agricultural areas and further exacerbate the situation. Blue mussel (*Mytilus edulis*) farms have to struggle with an increase in extreme weather events, which, among other things, result in the drifting of natural mussel beds that serve as seed mussel sources.
- Mussel farms, especially in the Wadden Sea in Lower Saxony, face major challenges due to changes in sedimentation conditions caused by hydraulic engineering measures such as fairway deepening and maintenance, which involve dredging and dumping and thus jeopardise the stability and productivity of the farms.
- A shortage of skilled workers is hampering knowledge transfer and the continued existence of businesses, with possible consequences for production and production quality. Production costs have risen since 2022 as a result of Russia's war of aggression against Ukraine (especially for electricity, fuel and feed). In addition, labour shortages and the minimum wage are leading to increased personnel costs.

2 Supply balance and trade

- In 2024, about 33,000 tonnes of fish and blue mussels were produced in aquaculture in Germany. In addition, there were approximately 160 tonnes of crustaceans, roe/caviar, algae and other aquatic organisms. This represents an increase in total production of almost 1,500 tonnes compared to 2023. Fish accounted for 51% of production in 2024 and molluscs for 49%.
- The most important species in freshwater aquaculture are carp, accounting for around 26%, and salmonid¹, which account for around 58% of total fish production from aquaculture (**Figure 1**). Rainbow trout production accounts for the majority of freshwater species produced.
- Mussels dominate the production of marine species (> 99% of the volume produced in salt water). In 2024, total blue mussel production in the Wadden Sea amounted to around 16,250 tonnes. Oyster farming on so-called table cultures and mussel farming in suspended cultures in the Baltic Sea, which are carried out by fewer than three companies in Germany, are not included in this profile unless explicitly referred to.

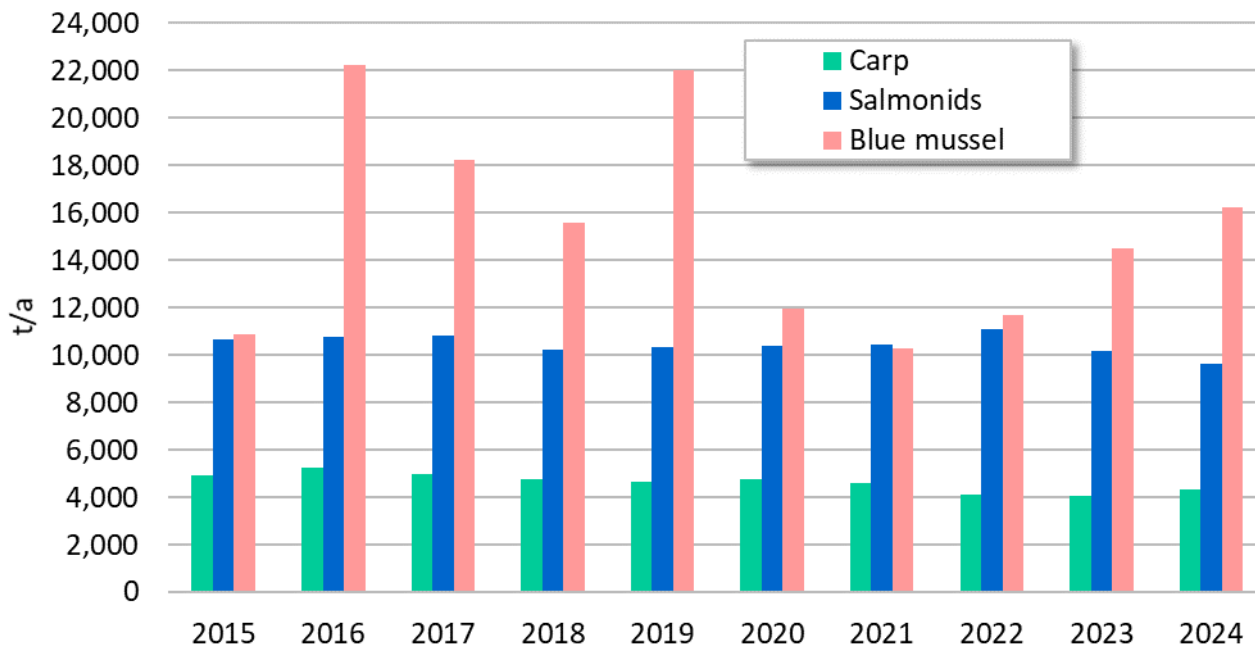
¹ trout-like species: brook trout, rainbow trout, also large rainbow trout, brook char, and sparcctic hybrid

Figure 1 Production share of freshwater species in Germany (2015–2024 average)



Data sources: GERMAN FEDERAL STATISTICAL OFFICE (DESTATIS) (1), various years; own illustration.

Figure 2 Production of the most important aquaculture species in Germany (tonnes per annum)



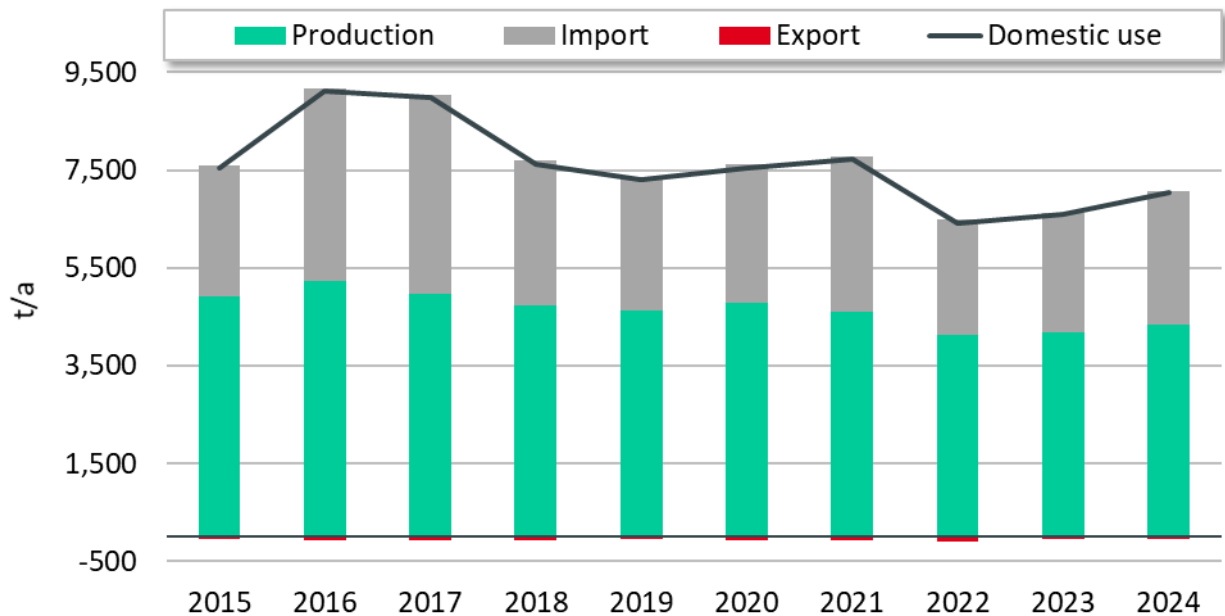
Data sources: GERMAN FEDERAL STATISTICAL OFFICE (DESTATIS) (1) for fishes; LLnL and SFA for blue mussels; various years.

Figure 2 shows the development of production of the most important aquaculture species (groups) since 2015.

- Carp production (farms > 0.3 ha) has shown a largely downward trend over the years; while production was still around 5,240 tonnes in 2016, it is only 4,334 tonnes in 2024.
- Salmonid production (farms > 200 m³) is around 10,600 tonnes per year. After an increase in production and reaching its highest level of 11,082 tonnes last year (2022), production fell in 2024 to its lowest volume since 2015, at 9,641 tonnes.
- Mussel production plays a special role in aquaculture, as its stock depends on the availability of wild seed mussels². From 2015 to 2016, production more than doubled, then remained at a relatively high level until 2019, and since 2020 has returned to approximately the 2015 production level (around 11,000 tonnes). Production has increased again since 2023.

Foreign trade and self-sufficiency rate

Figure 3 Domestic production and foreign trade of carp (t/a)



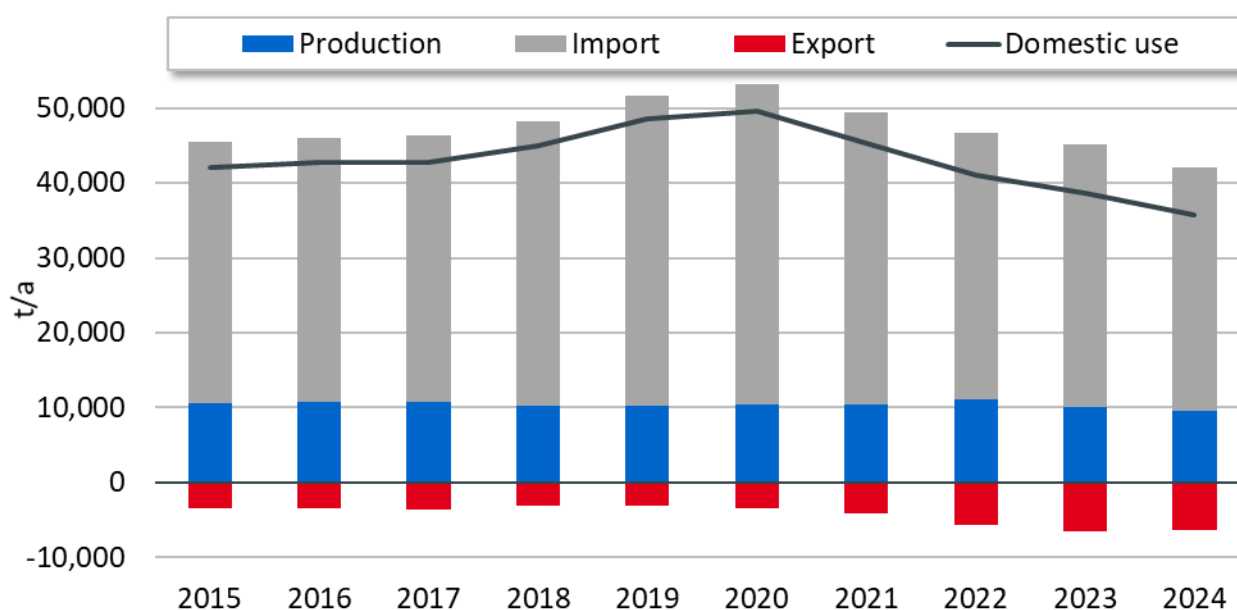
Data sources: GERMAN FEDERAL STATISTICAL OFFICE (DESTATIS) (1-2), various years; own illustration.

- Exports play only a minor role in carp production; 39% of the domestic supply (production, imports minus exports) or 2,988 tonnes of carp are imported on average (2015-2024), resulting in an average self-sufficiency rate of 61% over this period. Most of this comes from the Czech Republic and Poland. Germany is the main importer of Czech carp. If we add the quantity produced by small Bavarian farms to the approx. 4,000-5,200 tonnes of carp recorded in the aquaculture statistics (2015-2024), the self-sufficiency rate is up to approx. 10% higher.
- After imports of around 4,000 tonnes in 2016 and 2017, they declined to an average of 2,800 tonnes from 2018 onwards, with 2022 recording the lowest volume at 2,358 tonnes. The decline in imports was mainly due to production shortfalls in Czech production and the resulting lower availability. In 2024, the import volume rose again to around 2,750 tonnes.

² Juvenile blue mussels generally originate from spat collection systems. These systems provide surfaces in the water column for the settlement of drifting mussel larvae, which are harvested after developing into juvenile mussels. The supply of juvenile mussels, as well as the natural conditions for mussel farming in the Wadden Sea, are subject to strong natural fluctuations that are reflected in production levels

- The largest producers of carp in the EU are Poland, the Czech Republic and Hungary, which accounted for approximately 67% of total EU production in 2023. Germany is the fourth largest producer (Eurostat, 2025; Destatis, 2025). It should be noted that this refers to German production volumes from national aquaculture statistics, which only include farms above a defined production size (> 0.3 ha) and therefore do not reflect a large proportion of carp farms (more than 6,700 smaller farms), especially in Bavaria.
- According to German aquaculture statistics, around 40% of Germany's total carp production of 4,334 tonnes derives from Bavaria, 38% from Saxony, followed by Brandenburg with approx. 12%. If the small farms that are not included in the statistics are also taken into account, a total of approx. 4,000-5,000 tonnes are produced in Bavaria alone.

Figure 4 Domestic production and foreign trade of trout, other salmonids, various product forms³ (t/a)

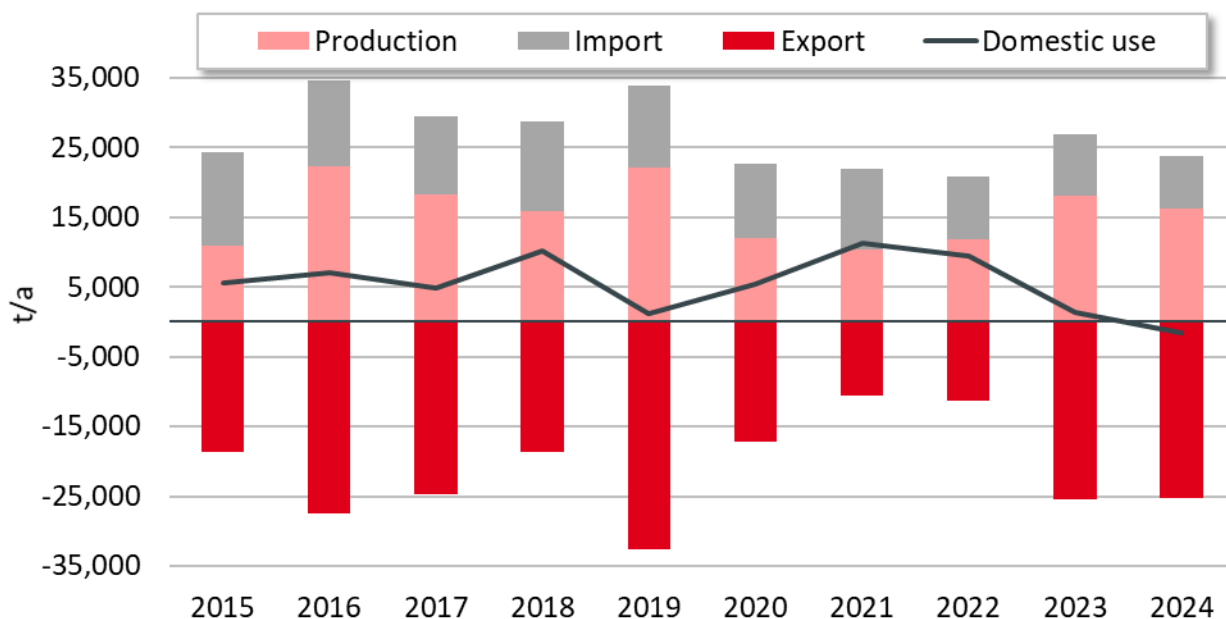


Data source: GERMAN FEDERAL STATISTICAL OFFICE (DESTATIS) (1-2), various years; own illustration.

- Exports also play a minor role in the salmonid sector.
- There is a high dependence on imports; 86% of the domestic supply (production, imports minus exports) has been imported on average in recent years (2015-2024), with the majority coming from the EU. The self-sufficiency rate in 2024 is approximately 26%.
- While imports increased continuously until 2020, there has been a downward trend since then. At the same time, export volumes since 2021 have been on average more than 2,300 tonnes higher than in the period between 2015 and 2020.
- Germany's main supplier countries in 2024 are Poland (mainly smoked goods), Denmark and, in third place, Turkey.
- The main producers of salmonids in the EU are Italy, France, Denmark and Poland, which together account for over 60% of total EU production (Eurostat, 2025). In Germany, approximately 69% of salmonids are produced in Bavaria, Baden-Württemberg and Lower Saxony.

³ Various product forms: fresh, frozen, processed, excluding salmon

Figure 5 Domestic production and foreign trade of mussels, various product forms⁴ (t/a)

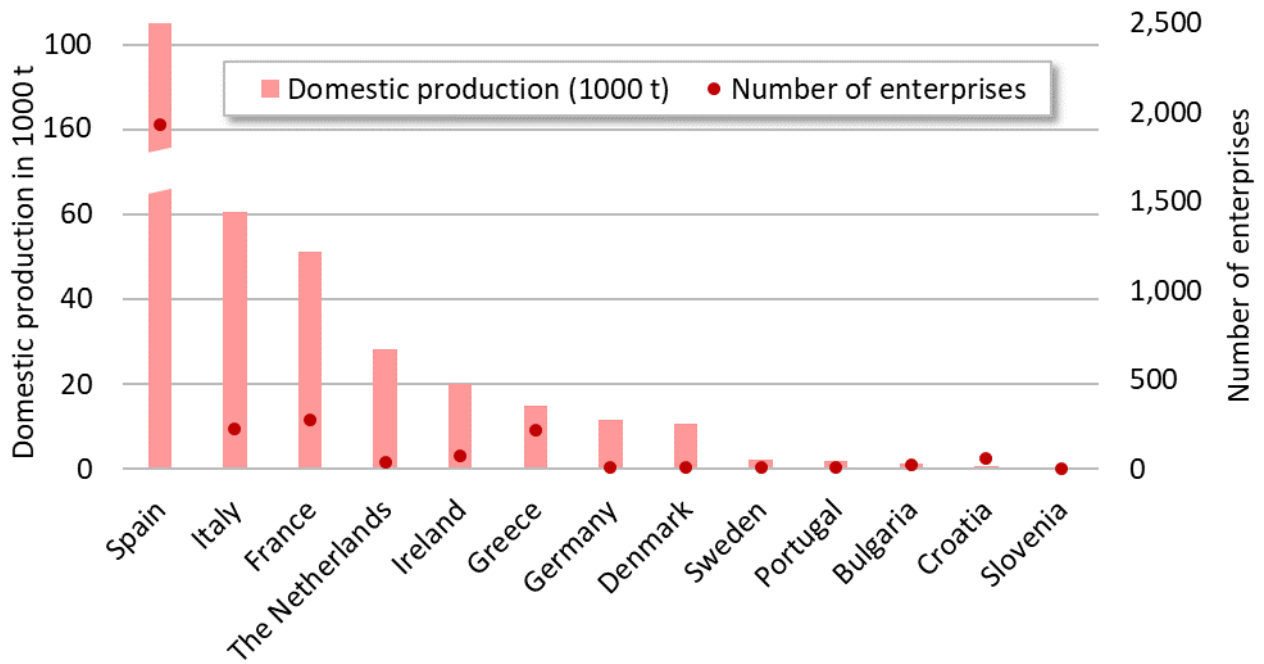


Data source: GERMAN FEDERAL STATISTICAL OFFICE (DESTATIS) (1-2), various years; LLnL and SFA for mussel production.

- While there was an import surplus of mussels between 2011 and 2014, an export surplus has been observed in most cases since 2015 (with the exception of 2021). In 2024, the foreign trade balance (exports minus imports) amounted to around 17,780 tonnes.
- More than 90% of the mussels produced in Germany are transported to Yerseke in the Netherlands, where Europe's only mussel auction is located.
- The majority of imported goods (over 90%) come from Denmark and the Netherlands.

⁴ Various product forms: fresh, frozen, processed

Figure 6 Mussel farms in the EU and their production (2022)



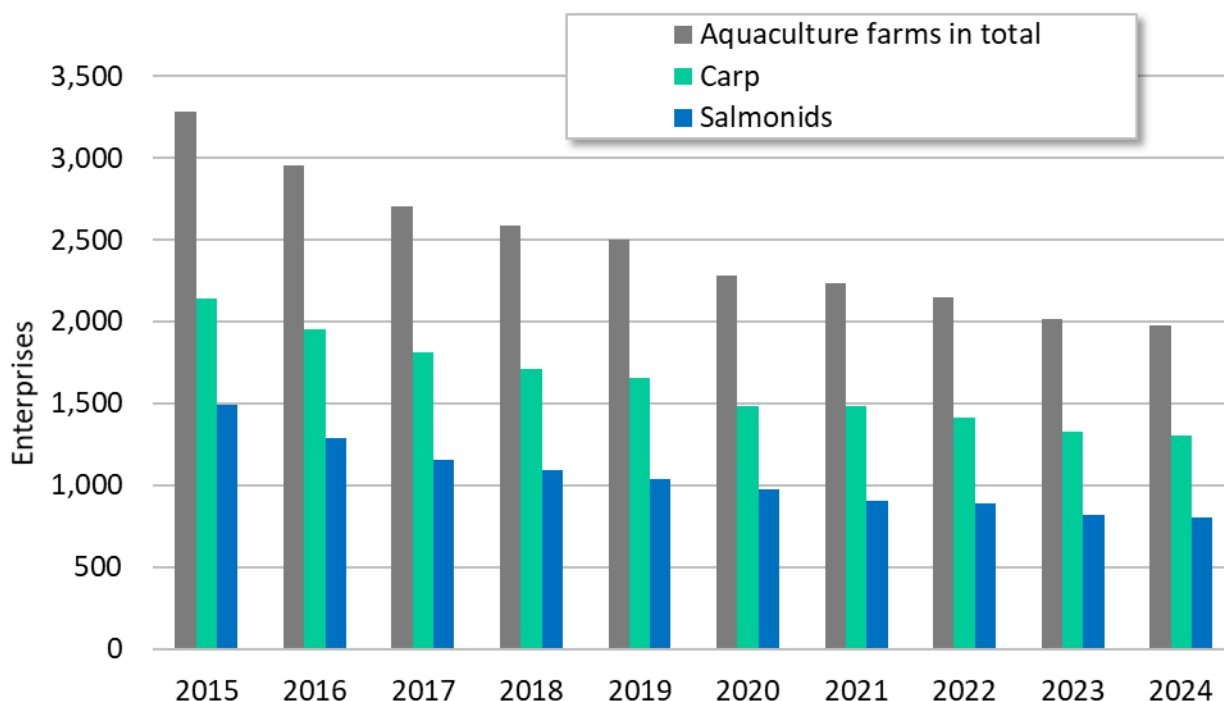
Data source: STECF (2025); own illustration.

- The most important producers in the EU are Spain, Italy, France and the Netherlands.
- Although there were only 9 mussel farms in the Wadden Sea in Germany in 2022 (compared to 1,933 farms in Spain and 224 farms in Italy), German companies ranked seventh in EU production in 2022 with 11,706 tonnes (compared to 192,000 tonnes in Spain and 60,500 tonnes in Italy).

3 Stocks and operating structures

3.1 Stocks and their development

Figure 7 Aquaculture farms in Germany and their main species



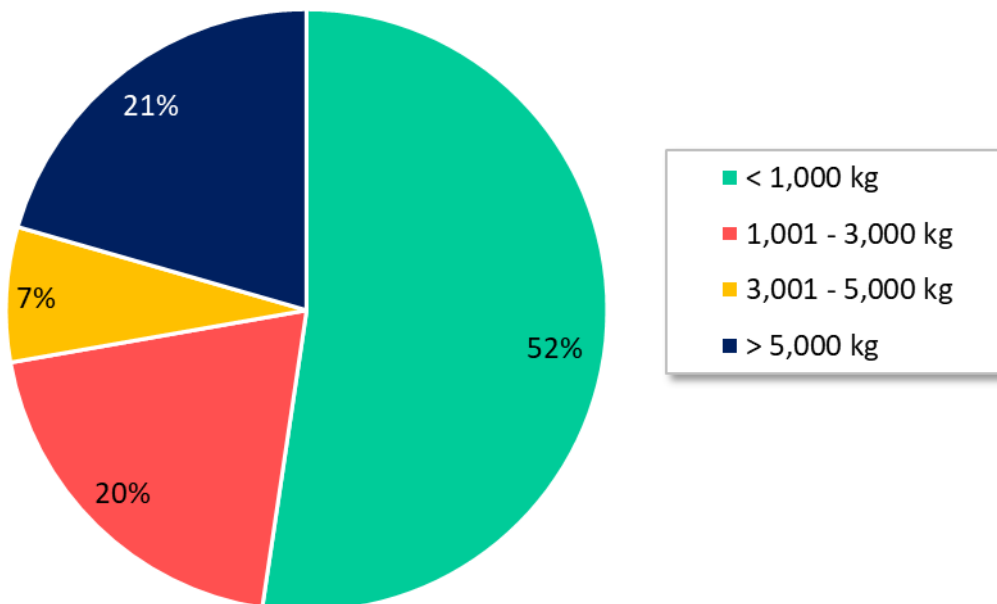
Data source: GERMAN FEDERAL STATISTICAL OFFICE (DESTATIS) (1), various years; own illustration.

- While there were still 3,285 aquaculture farms across all sectors in 2015, by 2024 there were only 1,978 (**Figure 7**). This corresponds to a decline of around 40%.
- Of these farms, a total of 1,303 farms produced carp and 802 farms produced salmonids in 2024 (double counting possible due to the keeping of both salmonids and carp). Here, too, the number of farms has declined by 39% and 46% respectively since 2015. Only farms larger than 0.3 ha or 200 m³ are taken into account here, but a downward trend in the number of farms is also observed among micro-enterprises.
- In mussel aquaculture in the Wadden Sea, there has been some operational restructuring within existing companies in recent years. However, the total number of farms remains stable at 9 in 2024.

Operating structures in freshwater aquaculture

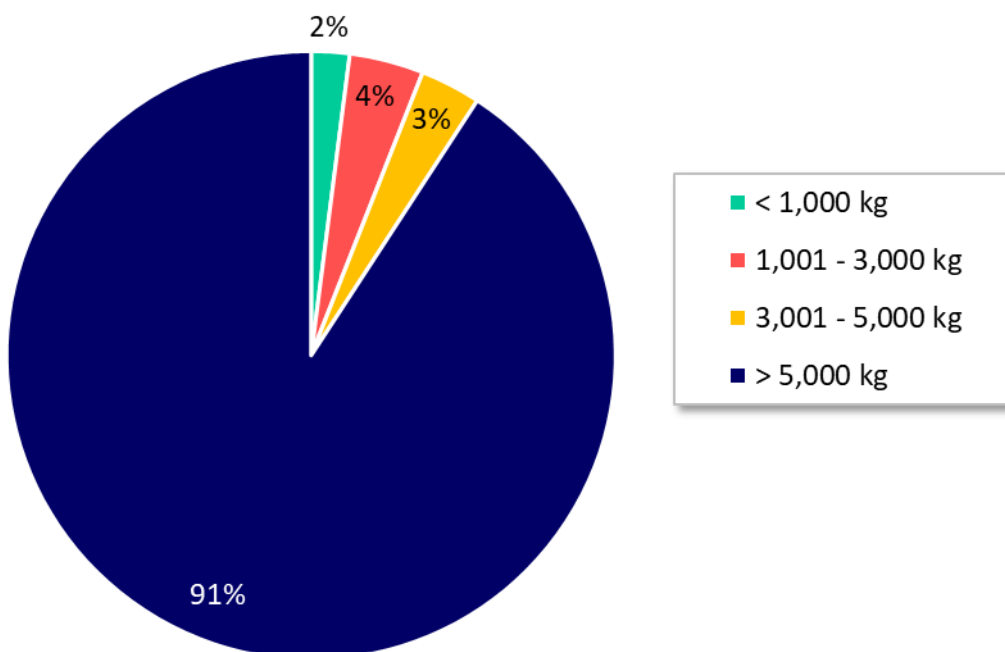
- **Figure 8** and **Figure 9** show the distribution of farms by size and the distribution of production in freshwater aquaculture.

Figure 8 Distribution of farms by size, all freshwater aquaculture with fish production



Data source: GERMAN FEDERAL STATISTICAL OFFICE (DESTATIS) (1), 2024, own illustration.

Figure 9 Distribution of production by farm size, all freshwater aquaculture with fish production



Data source: GERMAN FEDERAL STATISTICAL OFFICE (DESTATIS) (1), 2024, own illustration.

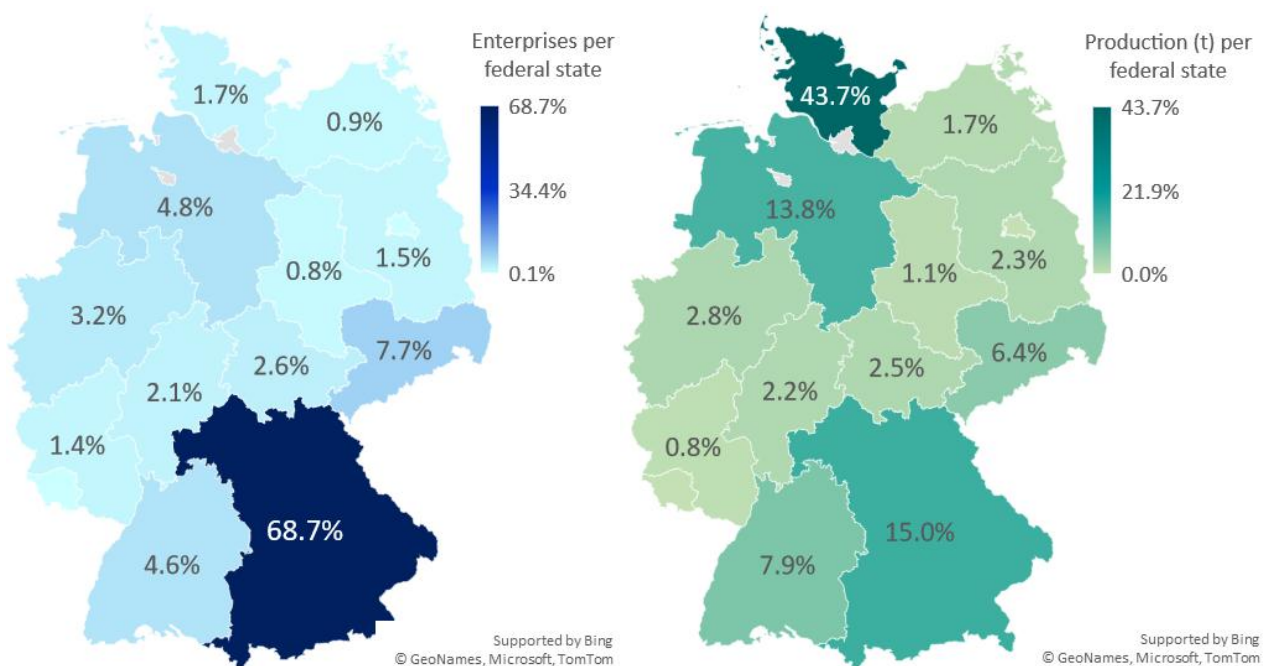
- 52% of farms with a production area > 0.3 ha or a facility volume of over 200 m³ produce 1,000 kg of fish or less, while approximately 21% of farms produce over 5,000 kg annually. However, 91% of total aquaculture production is produced in farms with an annual production of over 5,000 kg, while only approximately 2% of total production comes from farms with a production of less than 1,000 kg.
- The freshwater aquaculture sector is therefore characterised by small family enterprises that operate on a part-time basis. However, the majority of production comes from medium-sized, full-time businesses.
- If we also take into account the many micro-enterprises that are not included in the aquaculture statistics due to the cut-off limit, the ratio would shift even further towards the number of small family businesses and the production dominance of large enterprises. This structure is particularly prevalent in carp pond farming.

3.2 Operating structures and their development

The number and importance of aquaculture farms varies considerably between federal states:

- Approximately 69% of farms are located in Bavaria, where, however, only about 15% of the total volume is produced.
- Schleswig-Holstein is home to 1.7% of farms. However, around 44% of the total volume of German aquaculture production is generated here. More than 98% of this is molluscs (blue mussels and Pacific oysters).
- Lower Saxony is home to around 5% of farms, which produce a total of around 14% of German aquaculture products. Around 27% of these are blue mussels.
- The main producers of carp in Germany are Bavaria with around 40% and Saxony with 38% of production, followed by Brandenburg with 12%.
- Bavaria and Baden-Württemberg account for approximately 31% and 26% of the salmonids production in Germany, followed by Lower Saxony with approximately 13% and North Rhine-Westphalia with 8%.

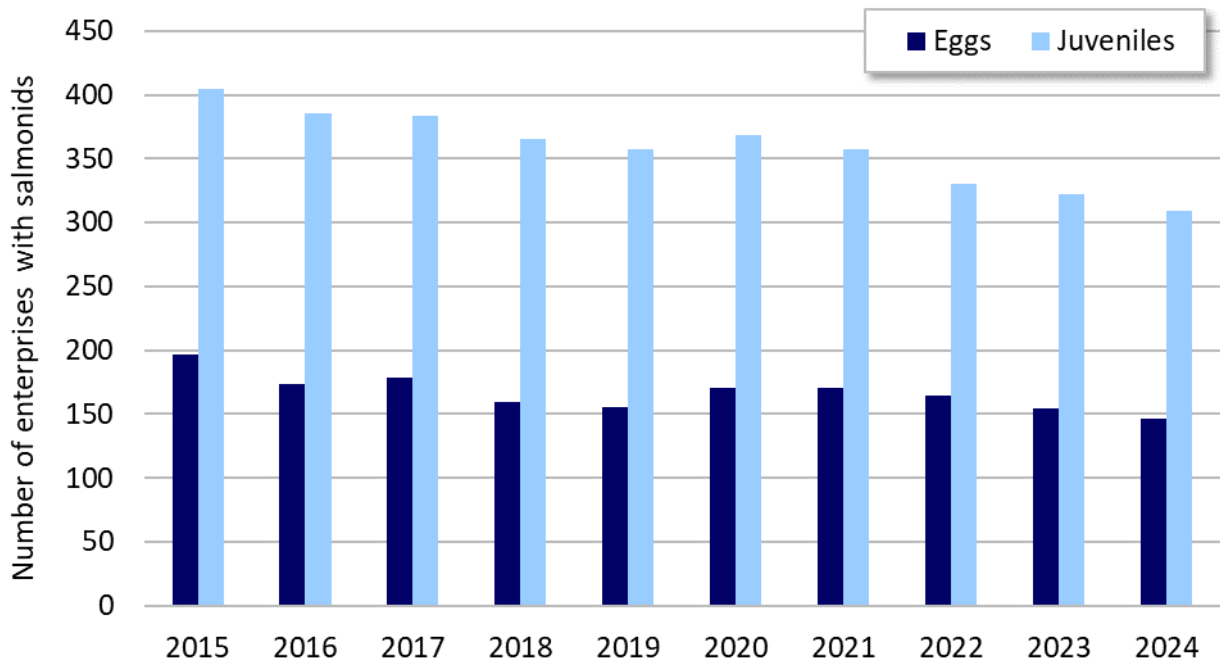
Figure 10 Regional importance of aquaculture farms and production in Germany (2024). Percentages represent the shares of the federal states in the total number of farms and total production.



Data source: GERMAN FEDERAL STATISTICAL OFFICE (DESTATIS) (1), 2024; own illustration.

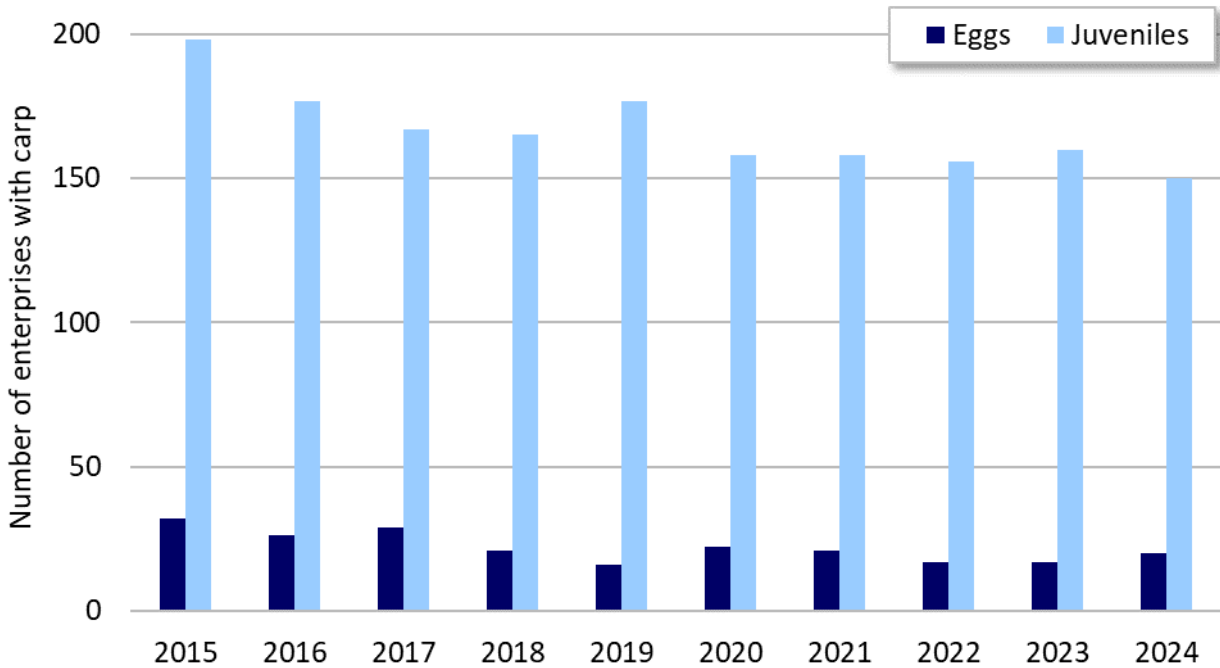
4 Cultivation methods, production systems and economic efficiency

Figure 11 Hatchery and rearing facilities for salmonids



Data source: GERMAN FEDERAL STATISTICAL OFFICE (DESTATIS) (1), various years; own illustration.

Figure 12 Hatchery and rearing facilities for carp



Data source: GERMAN FEDERAL STATISTICAL OFFICE (DESTATIS) (1), various years; own illustration.

- Aquaculture is divided into various production stages: brood production, rearing and grow-out.
- In 2024, there were a total of 146 farms in the salmonid sector rearing juveniles of trout species, with individual farms keeping several species at the same time and thus being counted multiple times in the individual species figures. At species level, 31% of farms keeping brook trout (*Salmo trutta fario*) produce eggs. The figure is 8% for rainbow trout (*Oncorhynchus mykiss*) farms, 17% for brook char (*Salvelinus fontinalis*) farms and 6% for sparcctic hybrid (*Salvelinus alpinus x fontinalis*) farms. Twenty of the carp (*Cyprinus carpio*) farms (1.5%) produced eggs in 2024. The number of farms has been on a downward trend since 2015.
- 309 of the salmonid farms, including 54% of brook trout farms, 20% of rainbow trout farms, 35% of brook char farms and 19% of sparcctic hybrid farms, as well as 150 of the carp farms (11%), rear juvenile fish; these figures are on a downward trend.
- The majority of juvenile fish are used by the farms for their own needs as stocking material. In addition to the food fish market, there is also a significant market in Germany for stocking waters for recreational and commercial fishing.

Characteristics of carp farming

- Carp are kept in shallow, still waters that are warm in summer. These are man-made ponds, some of which have shaped the cultural landscape for centuries. The shallow breeding ponds warm up quickly, stimulating the growth of plankton, which serves as natural food for the carp. Winter ponds, on the other hand, have a water depth of 2 m or more.
- A distinction is made between extensive and intensive farming. In extensive farming, only a small amount of additional feed is provided. Stocking densities are low. In nutrient-rich ponds, the natural food that emerges makes up a significant part of the fish's diet. The nutrient content can be influenced by controlled organic fertilisation and the interaction between plant production and animal husbandry.

Figure 13 Carp



- The intensity of rearing depends on the natural availability of feed in the pond and supplementary feeding with grain and mixed feed. Weight gain is controlled by supplementary feeding. Carp have a very high growth potential and can gain weight quickly under good conditions.
- Spawning ponds for carp reproduction are hardly used nowadays. Carp eggs are mainly obtained by means of so-called strip spawning. Larvae hatch from the artificially fertilised eggs. The young fish are reared and reach their slaughter weight of 1 to 1.5 kg after two to three summers. Carp are kept in monoculture or in extensive pond farming in polyculture together with other species. Secondary fish species include tench (*Tinca tinca*), but also predatory fish such as northern pike (*Esox lucius*), pike-perch (*Sander lucioperca*), European perch (*Perca fluviatilis*) and European catfish (*Silurus glanis*).

Characteristics of salmonid and trout farming**Figure 14** Flow-through raceways for rearing salmonids such as trout and char

- Salmonids are adapted to cold flowing waters with high oxygen content.
- Traditional farming systems such as flow-through channels and earth ponds are influenced by external factors. Farming systems in trout pond farming are traditionally operated as flow-through systems; the supply of fresh water is provided via a river, stream, or lake. Modern farming systems process the water and feed it back into the farming system (partial recirculation system) or keep the water in a closed circuit with less than 10% water exchange (recirculation systems).
- Rainbow trout usually reach sexual maturity in their second year (male spawners, sires) or third year (female spawners, dam). Reproduction is carried out in a controlled manner. The gametes are obtained mechanically by strip spawning. The eggs of a female are mixed with the milt of several males. The fertilised eggs are incubated in a hatchery building. The fish eggs hatch into young fish, which are fed with fry feed. Due to their better growth, all female stocks are often kept for rearing. In production, a distinction is made between fertilised fish eggs, eggs at the eyed stage, yolk sac fry, fry fully adapted to dry feed, fingerlings, fish for on-growing, portion-sized trout (200 to 250 g), and large rainbow trout (> 400 g).
- In practice, demand-optimised feeding has prevailed over *ad libitum* feeding (free intake) to ensure good feed conversion.

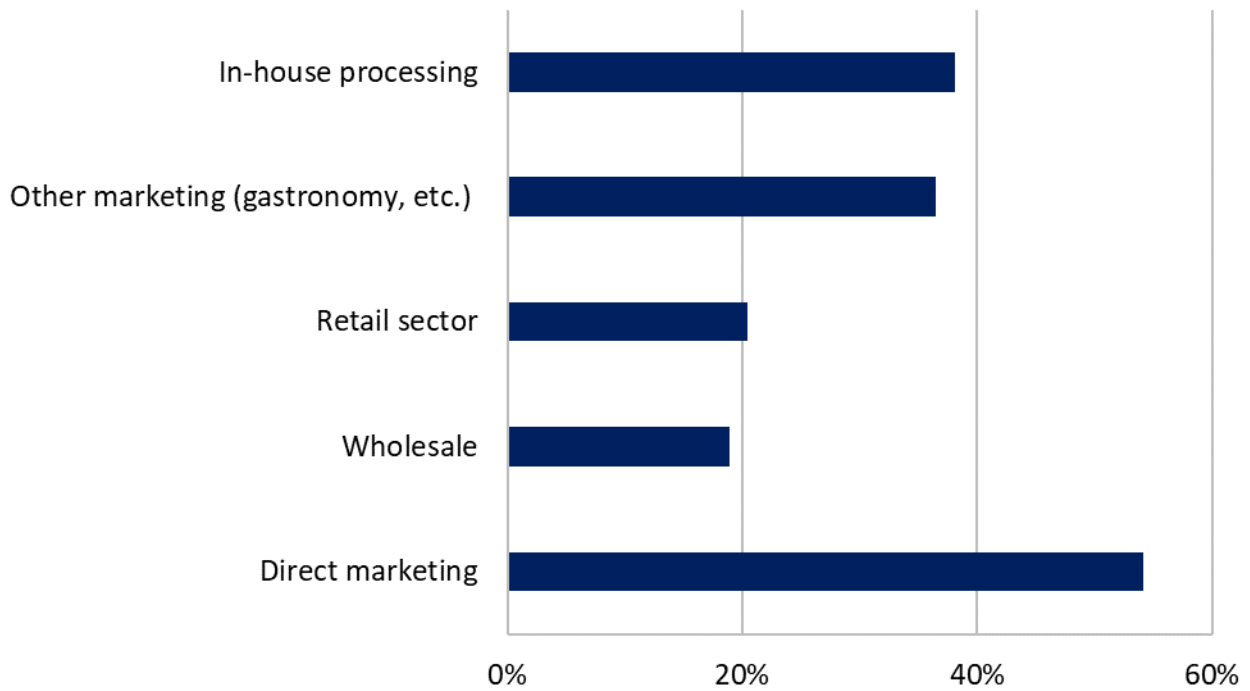
Characteristics of mussel aquaculture**Figure 15** Harvest of blue mussels

©Thünen-Institut/Lasner

- Blue mussel (*Mytilus edulis*) aquaculture is a marine culture and represents a combination of fishing and cultivation. Blue mussel beds mainly form in the tidal and shelf areas of the sea. In the North Sea, blue mussels are cultivated in permanently flooded areas of the coast or estuaries. The significantly lower blue mussel production in the Baltic Sea is achieved using longlines.
- The vast majority of blue mussel fishermen are active on the North Sea coast of Lower Saxony and Schleswig-Holstein, with a focus on the structurally weak areas of Dithmarschen and North Frisia. Only two companies are currently known to be active in the Baltic Sea. Harvest volumes in the Wadden Sea are subject to extreme fluctuations and depend on the spawning of natural blue mussel beds. The amount of spawning is influenced by natural factors (e.g., storms) and presumably also by anthropogenic factors (e.g., dumping).
- Blue mussel production can be divided into three phases: 1) seed mussel fishing or use of seed mussel extraction facilities and relocation to cultivation areas, 2) mussel growth, and 3) harvesting. Traditionally, young blue mussels (stocking mussels) were caught in the North Sea to obtain seed mussels. They originate from the natural spawning of wild and mostly unstable blue mussel beds in the Wadden Sea. However, most of the young mussels for the Lower Saxony cultures, as well as the entire share for the Schleswig-Holstein cultures, now come from seed mussel extraction facilities. The latter provide a suitable substrate in the water column for the blue mussel larvae drifting in the water to settle. The young blue mussels harvested or originating from mussel seed fishery are then spread over mussel farming areas (bottom cultures). Depending on the water quality, the blue mussels grow into edible mussels in 2 to 3 years.
- Mussel harvesting requires a permit. The federal states of Lower Saxony and Schleswig-Holstein issue a fixed number of licences. The designation of approved areas for mussel fishing and cultivation, as well as the requirements for carrying out these activities, are based on a multi-year management plan negotiated between the federal states, the Wadden Sea National Park Authority and the mussel companies. In recent years, the approved bottom cultivation area has been adjusted several times, which can represent a restriction for the companies depending on the usability of the areas.

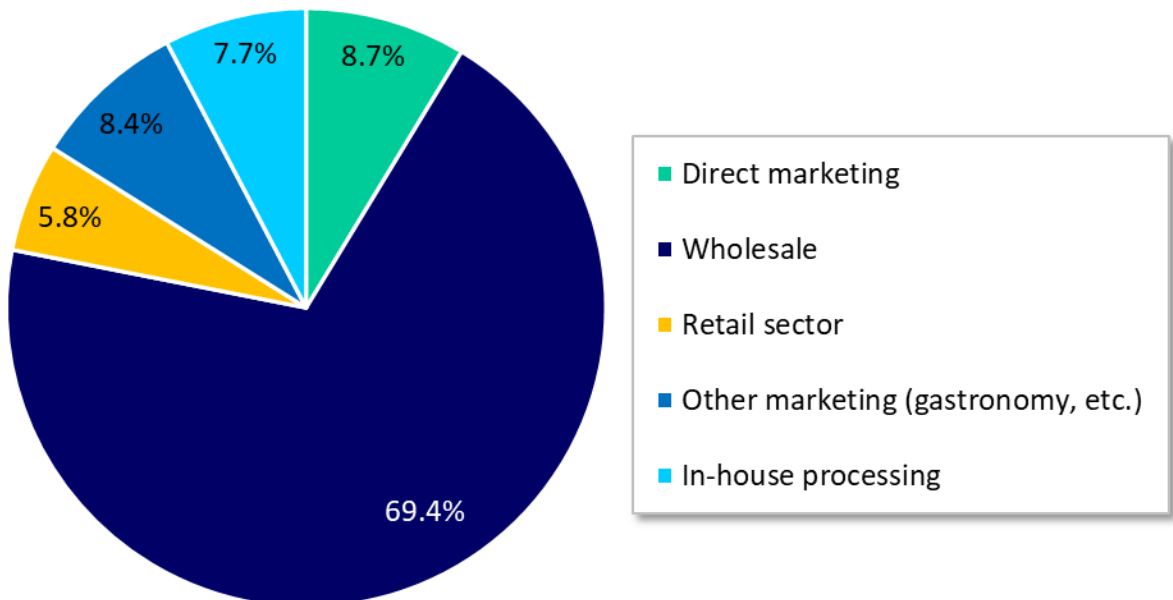
Marketing channels

Figure 16 Marketing channels of aquaculture enterprises (2023)



Data source: GERMAN FEDERAL STATISTICAL OFFICE (DESTATIS) (1), 2023; own illustration.

Figure 17 Marketing channels for unprocessed products and on-site processing by volume (2023)

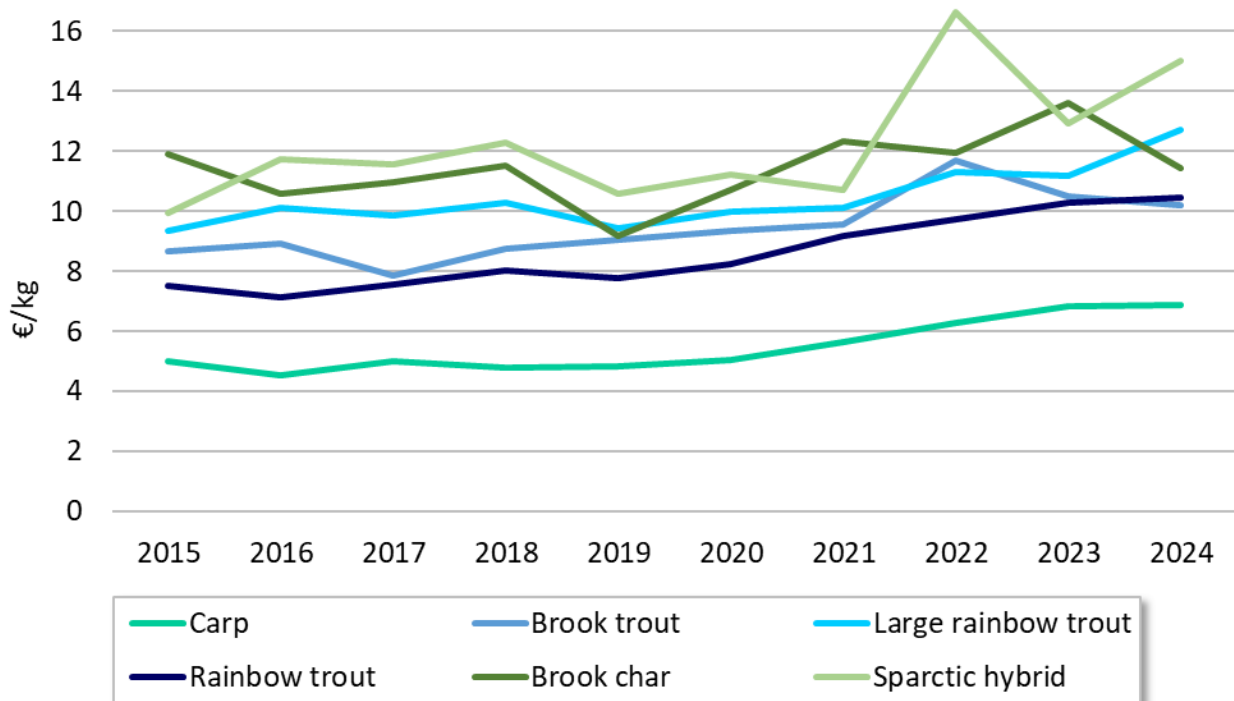


Data source: GERMAN FEDERAL STATISTICAL OFFICE (DESTATIS) (1), 2023; own illustration.

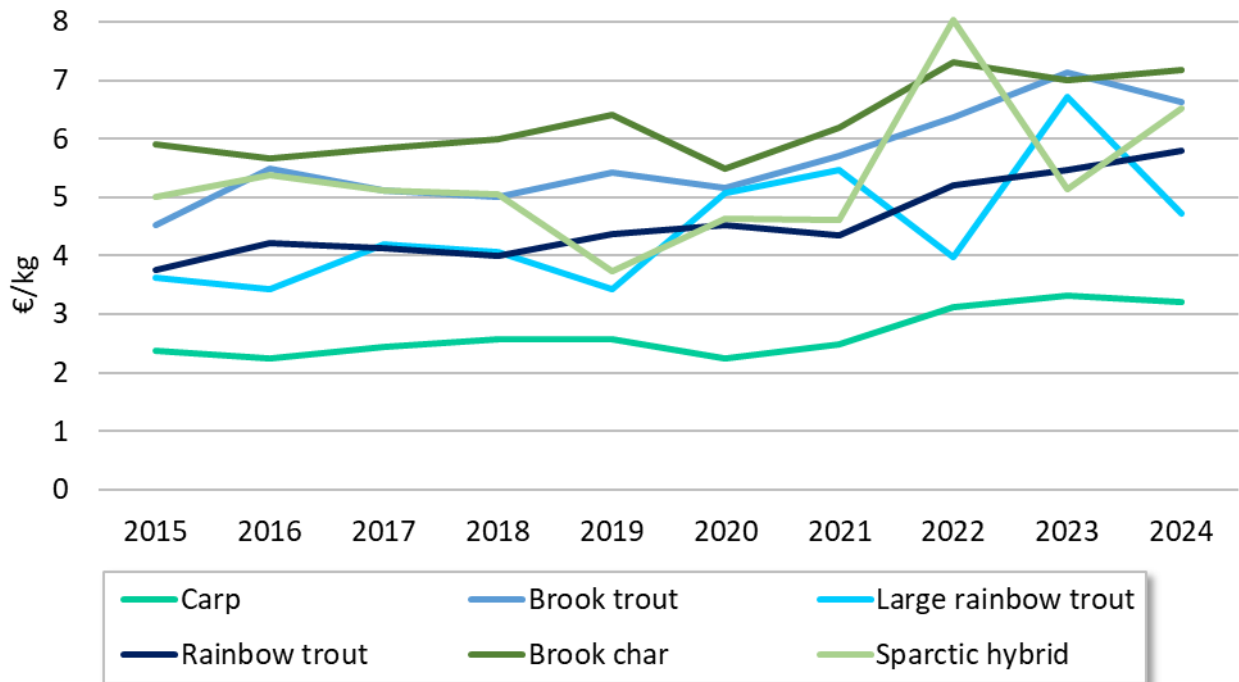
- 54% of farms market their products directly. Only 19% of farms supply wholesalers. Nevertheless, over 69% of products are sold through wholesalers, but only around 9% through direct marketing. Farms often use several marketing channels (see **Figure 16** and **Figure 17**).
- The proportions of the different marketing channels have shifted slightly compared to 2017: in 2017, only around 55% of the volume was sold through wholesalers and 20% of the volume through other channels, such as restaurants. However, the percentage distribution of farms selling their goods through the respective marketing channels has remained almost the same. Only the proportion of businesses using direct marketing or wholesale has increased slightly compared to 2017 (approx. 4% and 2% respectively). These shifts, such as the decline in marketing to "other marketing, including restaurants", could be due to changed market conditions since the coronavirus pandemic (e.g., closure of restaurants).

Price trends for freshwater aquaculture

Figure 18 Direct marketing prices (€/kg)

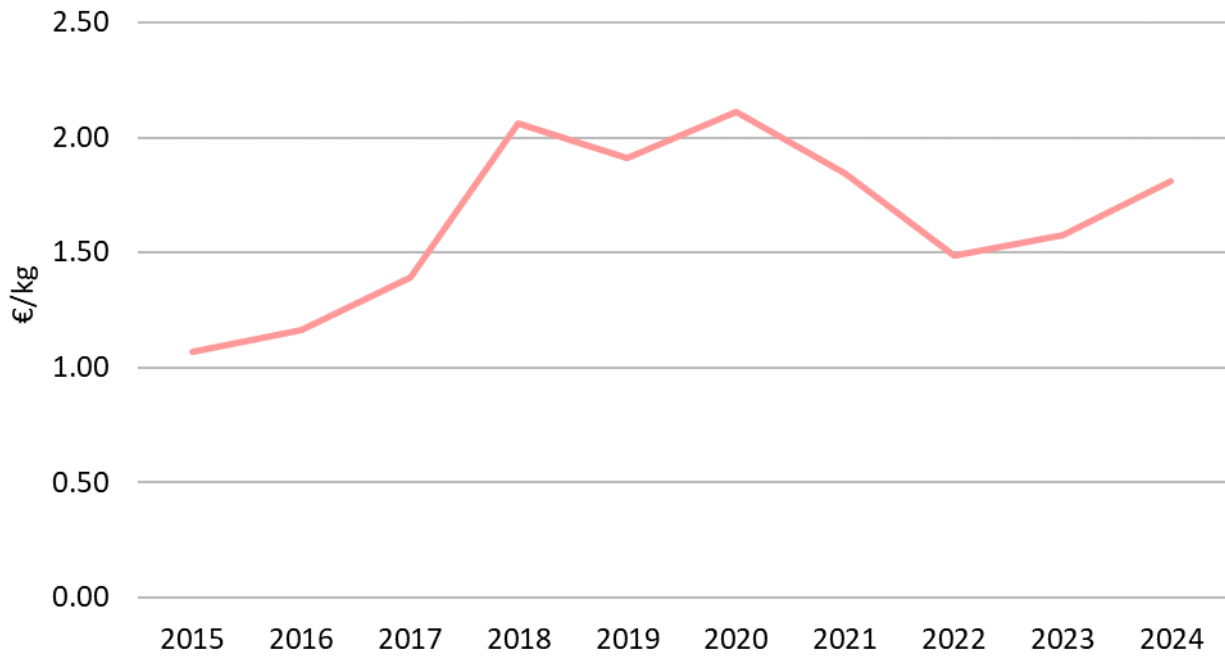


Data source: GERMAN FEDERAL STATISTICAL OFFICE (DESTATIS) (3), various years; own illustration.

Figure 19 Wholesale prices (€/kg)

Data source: GERMAN FEDERAL STATISTICAL OFFICE (DESTATIS) (3), various years; own illustration.

- **Figure 18** and **Figure 19** show the price trends for the most important marketing channels in each category. Prices show an upward trend over the entire period. In 2024, there were some significant price differences compared to the previous year, with an increase of approximately €1.40 per kilogram for sparctic hybrid in wholesale and approximately €2.10 per kilogram in direct marketing of sparctic hybrid, while brown trout recorded a price loss of approximately €2.20 per kilogram in direct marketing. The price of large rainbow trout was approximately €1.50 per kilogram higher in direct marketing compared to the previous year, while the wholesale price fell by €2 per kilogram.
- Over 50% of farms market some of their products directly. Prices in direct marketing are approximately 54% (brown trout) to 170% (large rainbow trout) higher than in wholesale marketing.

Price trends for blue mussels**Figure 20** Average revenues for blue mussels (€/kg landed weight).

Data source: BLE, LLNL & SFA, various years; own illustration.

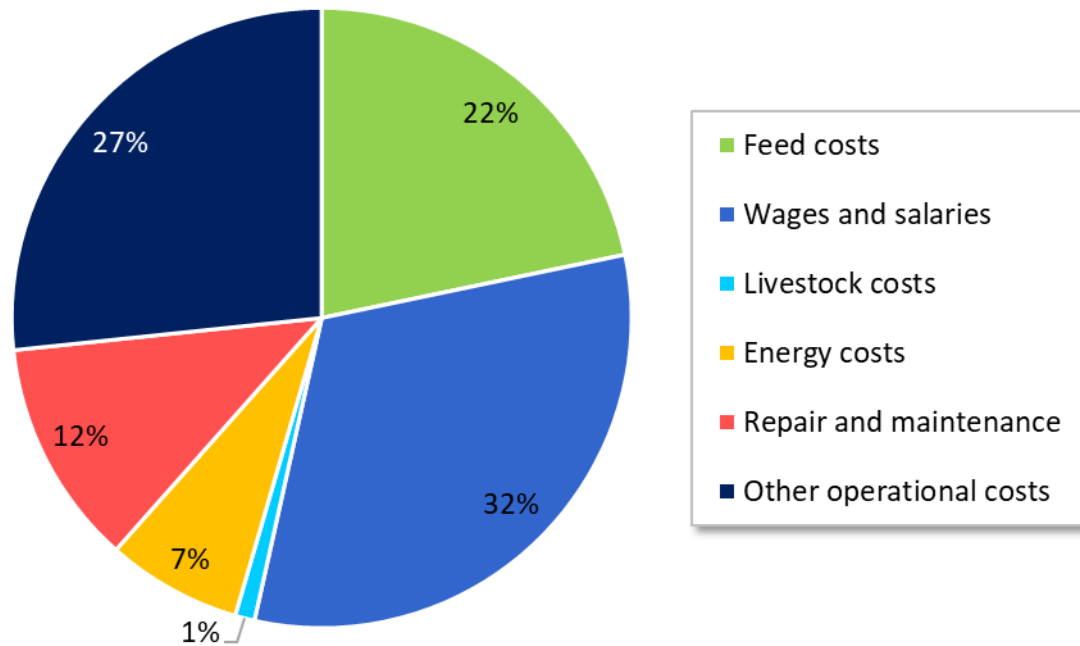
In the past, the price of blue mussels fluctuated between €1.07 and €2.11 per kg live weight, with an annual average of €1.81 per kg in 2024.

Cost structures of aquaculture

Figure 21, **Figure 22** and **Figure 23** show the distribution of average operating costs in the most important aquaculture sectors in Germany. The figures show the percentage distribution of direct operating costs.

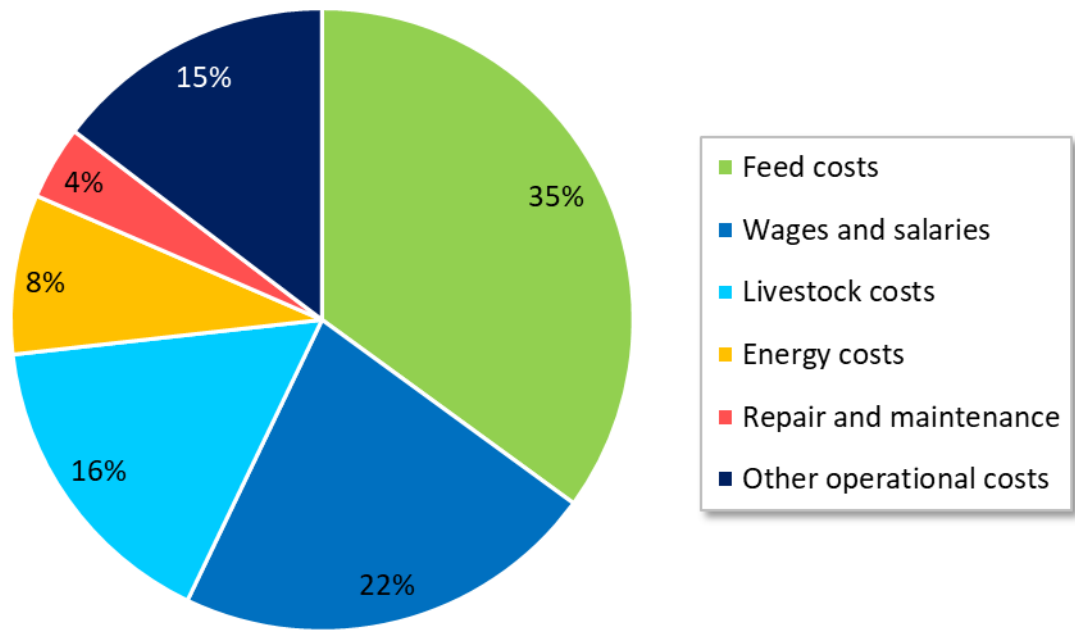
Feed, personnel, and energy are important cost factors in fish farming. They vary depending on the type of facility and fish species. Larger farms often have more favourable cost structures than smaller ones; they can take advantage of purchasing economies, automate processes and streamline their work organisation.

Figure 21 Cost structure of carp farming (average 2017–2022)



Data source: DCF, various years; own illustration.

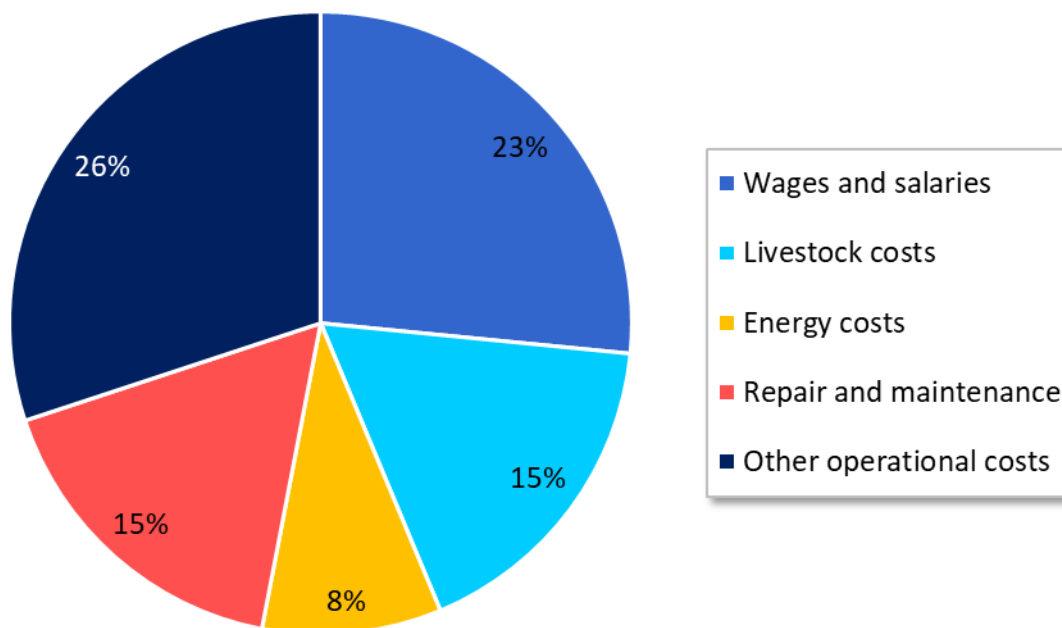
The distribution of costs in carp pond farming varies from region to region. On average and over the years 2017-2022, 32% of production costs are attributable to personnel costs, 22% to feed and 27% to other operational expenses (see **Figure 21**). Stocking, energy and maintenance costs account for smaller proportions. In addition, there would be significant additional labour costs if the owners' own work were to be remunerated (opportunity costs). A typical farm in Bavaria has lower feed costs than a typical farm in Saxony, as there is a greater amount of natural food supply. On the other hand, there are higher costs for stocking material, which is raised in larger carp farms in Saxony but is usually purchased by small Bavarian farms (Huber & Lasner, 2020) and can account for up to 20% of operating costs. In 2022, feed costs in particular have risen significantly and account for almost 30% of total costs.

Figure 22 Cost structure of trout farming (average 2017–2022)

Data source: DCF, various years; own illustration.

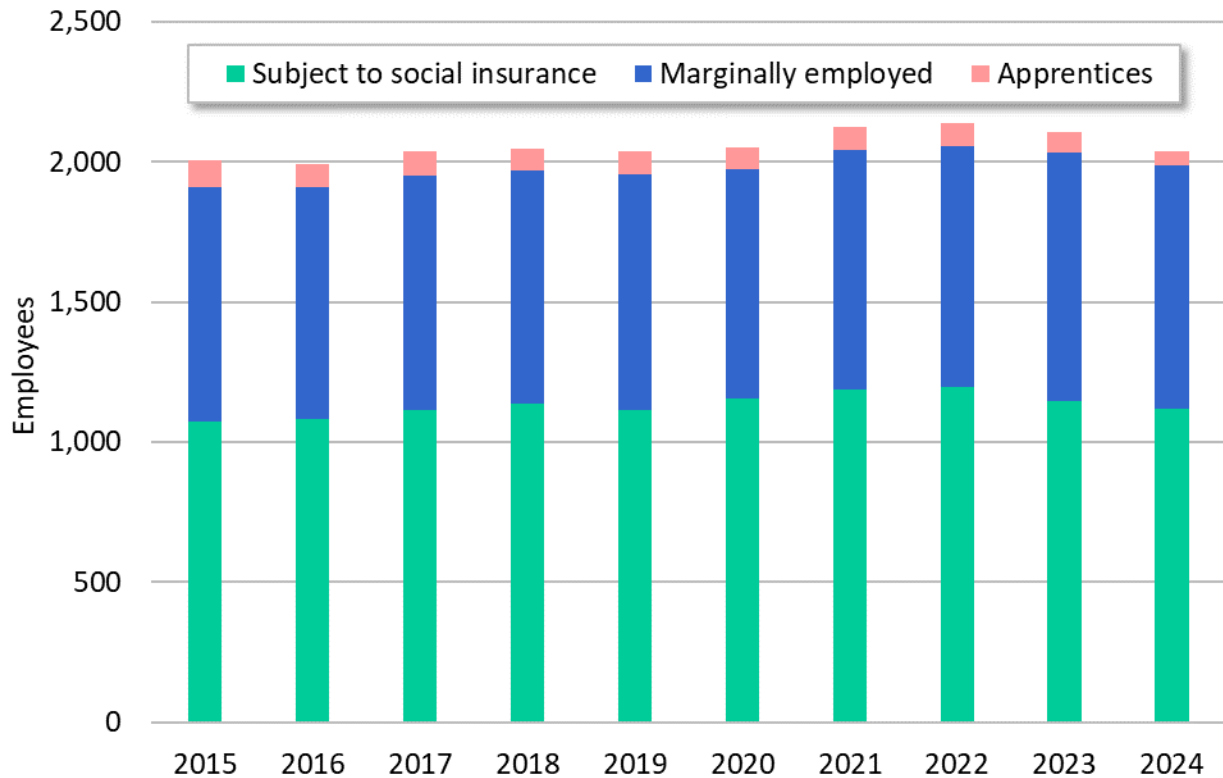
In trout farming, feed costs account for 35% of operating costs, while personnel costs account for 22% and stocking costs for 16% (see **Figure 22**). Trout are usually fed industrially produced, protein- and energy-rich pellet feed. Production costs per kg of trout have risen significantly in 2022, particularly in terms of feed and energy costs.

Figure 23 Cost structure of mussel production (average 2015–2022)



Data source: DCF, various years; own illustration.

- In mussel production, personnel costs account for the highest single cost component at 23%; 15% of costs are spent on stocking and the shipyard, and 26% on other operational costs. It is striking that there are no feed costs. Mussels filter the nutrients they need from the surrounding water. Supplementary feeding is neither necessary nor possible.
- Mussel production is very cost-intensive due to the high investment in specialised vessels and, in some cases, harvesting equipment for seed mussel collection.
- It should also be noted that energy costs in particular have risen since 2022 for mussel production.

Employment in aquaculture**Figure 24** Employees in aquaculture

Data source: ARGE, various years; own illustration

- The average number of employees in aquaculture across Germany over the last 10 years is 1,915. In addition, there are around 80 apprentices. The classification of apprentices is based on the main economic sector of the apprenticeship company and not on the profession acquired, and therefore cannot be directly assigned to the aquaculture sector. In 2024, 165 of the 2,026 employees (including apprentices) work in marine aquaculture. The majority of these are likely to be employed in land-based aquaculture systems, for example for shrimp farming (whiteleg shrimp: *Penaeus vannamei*), while around 60 employees are assigned to mussel farms in the Wadden Sea.
- The employment office's statistics do not cover a significant proportion of the workforce. In addition to the farm managers, this includes family members who help out on the farms.

5 Information on data sources

The aquaculture data query of the German Federal Statistical Office (Destatis) and the landing statistics of the BLE are updated annually. Since 2015, Destatis no longer records small farms below 0.3 ha or 200 m³ of water surface area. Within Destatis surveys, some data (e.g., marketing channels) are collected only every three years (most recently in 2023). Data collection by the Scientific, Technical and Economic Committee for Fisheries (STECF) was last carried out in 2024 for previous years. Data under the EU Data Collection Framework (DCF) were collected in 2024 for the years 2021 and 2022. FAO/Eurostat aquaculture statistics are published with a delay of around two years (latest update in 2024 for 2022 data).

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