

## Transformation into cage-free systems for layers in German speaking countries

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## Summary

The author was asked by the University of Warsaw to compile a working paper on the experiences with the phasing out of cage farming in Germany and possibly other countries. From 1993 to 2005, **the author** worked at the University of Kassel (Federal State of Hesse) as an assistant to Prof Fölsch at the Chair of Animal Welfare (Prof Fölsch was involved in the phasing out of cage farming in Switzerland). Since 2005, the author has held a chair for organic animal husbandry at the University for Sustainable Development in Eberswalde (Federal State of Brandenburg). He accompanied the phase-out of cage farming in Germany with several detailed expert reports on the animal welfare of enriched cages (1999, 2004, 2005, 2009), feasibility studies (2001) and expert reports on the depreciation period of cages (2012). In addition, he was involved in several research projects on alternative laying hen husbandry (e.g. free-range systems, mobile houses), and in the last ten years also on alternative breeds as well (e.g. dual-purpose chickens), and on economic calculations of animal welfare measures in poultry (e.g. European Chicken Commitment).

The **aim of the working paper** is to compile experiences with phasing-out cage-rearing in German-speaking countries. In addition to a chronological presentation of important events, extensive numerical material is compiled in the appendix.

The clear focus of the presentations is on Germany. On the one hand, this was of main interest to the clients. For another, Germany is one of the leaders in Europe in terms of the number of laying hens, so that the experiences are perhaps of particular importance.

A look at Austria seemed interesting, as this is the first EU country where cages no longer exist and the Austrians have strongly emphasised quality-oriented egg production.

Even though Switzerland is not a member of the EU, its experience could be helpful as it banned cage farming early on, with some special measures.

In the **text section** of the working paper, the development up to the ban on cage-rearing and thereafter up to the present day is presented separately for the three countries in chronological order, and in much greater detail for Germany.

In the **annex** of the working paper, the effects of the cage ban on the egg market (imports, exports), the structure of laying hen husbandry (number of farms, places, average flocks), the development of the individual types of husbandry, consumer demand, consumer prices as well as economically relevant aspects for farmers (producer prices, performance of the hens) are presented, again with a focus on Germany.

Furthermore, calculations on the economic viability of various forms of husbandry in Germany (enriched cages, alternative husbandry systems) are compiled in the appendix.

In addition, recent studies on animal welfare in laying hens from Germany are listed in the appendix. The text part and the appendix each stand on their own and can therefore be read separately. The text part also does not refer to all the figures or tables in the appendix.

Table 1 compares some framework data of the three countries. Switzerland banned conventional cages much earlier (in 1981, with **transition periods** until 1991) than the EU (in 1999, with transition periods until 2012). EU member Austria followed in 2004 with a shortened transition period until 2009, Germany (after a first attempt in 2002) in 2006 with transition periods until 2008 (2009). Enriched cages were also banned in Switzerland from 1991, in Austria in 2004 with transition periods until 2020 and in Germany in 2015 with transition periods until 2025 (2028). However, in 2006 Germany had set higher requirements for enriched cages (so-called small group housing) than in the EU Directive, in particular higher space requirements.

Thus, the transition to alternative forms of husbandry has taken longer in Germany than in Switzerland and Austria, which was also related to the much larger numbers of hens and larger farm sizes. On the other hand, most farms already switched to alternative systems instead of enriched cages when conventional cages were banned (from 2010) (18% in 2011, only 5% in 2020). One main reason

for this was the delisting of eggs from caged hens by almost all supermarket chains shortly before the ban. According to their own statements, the chains reacted to corresponding consumer demands. However, they have always achieved higher profit margins on alternative eggs.

In Switzerland and Austria, too, there had previously been delistings of eggs from caged hens from the retail trade.

In Switzerland, free-range systems dominate today (over 90 % incl. organic), whereas in Austria and Germany it is floor systems (approx. 60 %). However, free-range and organic farms are increasing in these countries, as are household purchases, despite higher egg prices. Increasingly, processing companies are also using alternative eggs and labelling their products with them.

Current profitability evaluations from Germany show that farms can make a profit with alternative husbandry systems. There are only minor differences in the performance of the hens between the husbandry systems.

All three countries have been able to increase their domestic production since the cage bans, as well as per capita consumption. Higher production and prices have resulted in higher value added for the egg sector.

Overall, the transition to cage-free systems has been successful in the three German speaking countries, even if it has taken a long time, especially in Germany.

In summary, **favourable factors for the conversion** to cage-free systems were (countries in brackets):

- Pressure from animal welfare organisations (CH, A, D)
- Comparison of housing systems in research projects (CH, D)
- Studies on improving alternative husbandry systems (CH, A, D)
- Strong consumer demand for alternative eggs and willingness to pay higher prizes (CH, A, D)
- Retailers delisting eggs from caged hens (CH, A, D)
- Stricter animal welfare regulations (CH, A, D)
- Approval of mass-produced housing facilities only after state inspection by ethologists (CH)
- Setting of upper limits for the number of laying hens per farm (CH)
- Payment of annual subsidies for alternative housing systems (CH)
- Investment subsidies for alternative husbandry systems (A, D)
- Highlighting nationally produced eggs as a speciality (CH, A)
- Willingness of neighbouring countries (e.g. Netherlands) to switch to alternative egg production for export (D)

**Table 1: Comparison of key data for Switzerland, Austria and Germany (2020)**

	<b>Switzerland</b>	<b>Austria</b>	<b>Germany</b>
<b>Ban conventional cages (transition)</b>	1981 (1991)	2004 (2009)	2002 (2007)* 2006 (2009)
<b>Ban enriched cages (transition)</b>	1986 (1991)	2004 (2020)	2002 (2007)* 2025 (2028)
<b>First delisting cage eggs by retailers</b>	1989 domestic 1996 imports	1994 (Billa)	2004 (Aldi)
<b>Farms with laying hens</b>	12,200**	1242 (> 350 places)	46,710 (> 5 ha)
<b>Laying hens</b>	3,485,700**	7,120,000	60,853,000
<b>Hens per farm</b>	286**	5,733	1,303
<b>Egg production (billion)</b>	1,064	2,17	14,42
<b>Per-capita consumption (eggs/year)</b>	189	236	239
<b>Self-sufficiency rate (%)</b>	64.1	90	71.8
<b>Production value eggs</b>	291 Mill. Sfr.	295 Mill. €	1,184 Bill. €
<b>Hens in cages (%)</b>	-	-	4,4
<b>Hens in barns (%)</b>	7.2**	61	64.8
<b>Hens in free-range (%)</b>	64.6**	26	21.4
<b>Hens organic (%)</b>	17.7**	13	9.5

\* The first ban was reversed by new law, \*\* 2019; Sfr. = swiss francs

## Switzerland

In **2019**, 12 200 farms kept 3 485 700 laying hens (17 % barn, 65 % free range, 18 % organic) and produced 1.033 billion eggs. In 2020, per capita consumption amounted to 189 eggs and self-sufficiency 64 % (shall eggs 76 %). The value added of hen farming was 291 million Swiss Franc<sup>1 2 3</sup> (compare Table 9 in the appendix).

The following history of phasing out cages is essentially based on key sources<sup>4</sup>.

During the **1960s and 1970s**, the concentration of hen farming increased sharply (see Figure 28 in the appendix) and with it the proportion of caged hens. Chicken farmers became interested in the cages as egg prices fell in the 1960s. The first larger cage facility had already been built in 1935.

During the **1970's**, there were two big studies in Switzerland concerning the impact of hen keeping methods and of the stocking density on laying performance, state of health, and well-being.

In **1974**, 160 000 people signed a petition calling for the abolition of factory farms.

As early as the 1960s, there were initial efforts to achieve a federal animal protection law, then intensified **in the 1970s**. At that time, there were only some cantonal animal welfare acts. The Federal Council charged a research commission chaired by Prof Andreas Nabholz, director of the Federal Veterinary Office at the time, with the elaboration of an appropriate draft for an Animal Welfare Act. The prohibition of cage keeping of poultry was a controversial issue already within the commission. However, in article 5, the study commission accordingly proposed to prohibit the keeping of poultry and pigs in cages.

Big poultry farmers particularly resisted strict regulations with all their means. They pleaded for an act that would merely provide a general framework, with the exact details to be regulated in a future ordinance. Commercial battery farms produced the majority of the Swiss eggs at the time. They warned the public of the consequences of 'exaggerated' animal welfare: Eggs and meat would become more expensive, consumers would increasingly buy cheap imported products, and national production would be disrupted.

The resistance of the battery farmers made the Swiss Animal Protection (STS), the Swiss Association for the Protection of Nature and the WWF demand a strict ban on cage batteries in another petition. With 400 000 signatures, the petition was submitted in **1976**.

The Federal Council gave in to the urges of the egg producers and, at the beginning of **1977**, submitted to the Parliament a bill without concrete prohibitions in article 5, just mentioning competence of the Federal Council to prohibit keeping methods with ordinances.

One of the reasons for this more open wording were hopes placed in a get-away-cage newly developed at the Swiss Poultry Breeding College (Oester 1985).

At the **end of the 1970s**, experiments comparing cage and floor husbandry were carried out by the ETH Zurich (Anonymous 1982).

In the following, public pressure forced the Federal Council to show its colours before the parliamentary debate about the bill. In its message to Parliament and later on in the voting brochure it announced a ban on the usual cage keeping. Under this condition, Parliament approved the Animal Welfare Act at the beginning of **1978**.

In **1980**, the federal government enacted an ordinance concerning maximum stocks in animal keeping. It limits poultry keeping to a maximum of 12,000 laying hens per farm (18,000 hens when also pullets were reared at the farm). Until 1984, the reduction of higher animal stocks was assisted by subsidies. Furthermore, the state enacted a requirement of authorization for housing units with more than 500 hens. The transfer of egg production to rural farms could thus be directed centrally.

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<sup>1</sup> <https://www.bfs.admin.ch/bfs/de/home/aktuell/neue-veroeffentlichungen.assetdetail.15464440.html>

<sup>2</sup> [https://www.aviforum.ch/Portaldata/1/Resources/bildung/referate\\_tagungen/1\\_Gloor\\_Statistiken.pdf](https://www.aviforum.ch/Portaldata/1/Resources/bildung/referate_tagungen/1_Gloor_Statistiken.pdf)

<sup>3</sup> <https://www.blw.admin.ch/blw/de/home/markt/marktbeobachtung/eier.html>

<sup>4</sup> Oester & Fröhlich 1986, Häne 1999, Fröhlich & Oester 2001, Studer 2001, Schmidt 2002, STS 2004, Oester & Fröhlich 2006, Steiger 2008, Balsiger 2016

As a result, more farms started keeping poultry, also in view of the lack of other alternatives (milk quota).

In **1981**, the first national Animal Welfare Act then came into force, at the same time the corresponding Animal Protection Ordinance.

The minimum requirements (nests, perches, etc.) included a de facto ban on conventional battery cages with a 10-year transition period.

Article 1 of the Animal Welfare Act stated: "Animals shall be kept in such a way as not to interfere with their bodily functions or their behaviour and overtax their capacity to adapt. Feeding, care and accommodation are appropriate if they meet the needs of the animals according to the state of experience and the knowledge of physiology, behavioural science and hygiene."

The Animal Welfare Act contained furthermore the obligation that new housing facilities must be approved by the state (authorisation and test procedure). Two test centres were set up by the Federal Veterinary Office (FVO) to assess animal welfare, with ethologists, veterinarians and agronomists working there. The requirement of authorization hadn't been introduced only to protect the animals, but also to prevent high costs to the producers and the construction companies.

The house construction company submits its application including blueprints, details about material and construction, references, etc. to the FVO. If there are doubts about the appropriateness for animals, if the equipment is new, or if there is a lack of scientific documents or practical experience, a practical inspection will be carried out by one of the inspection bodies or at practical farms. Systems and equipment will be examined for possible faults, and improvements will be suggested. An authorization based on this and granted by the FVO can be limited and combined with additional conditions<sup>5</sup>.

However, the regulations did not contain a ban of any kind of cages. Thus, enriched cages and Pennsylvania Systems were tested by the test centre for poultry in Zollikofen (1985 – 1993). Pennsylvania systems are spacious as barn systems and have a slanted wire floor, perches, laying nests and possibly an additional littered area. Due to the animal welfare problems identified (e.g. plumage damage, increased mortality, hindered dust bathing), these systems were not approved, nor the cages notified for testing.

In **1986**, the Federal Veterinary Office ruled out efforts to continue cage keeping under different conditions: It withdrew the temporarily granted authorization of all the cage systems that were still on the market. Cages were banned from 1991 on.

In parallel, aviaries were developed as a new system (Fölsch et al. 1983) and several aviaries approved by the test centre. Aviaries try to improve the conventional deep litter system (barn eggs) by providing raised tiers and by dividing the environment into different functional areas.

Construction companies quickly applied for the inspection of several aviaries; in **1986**, five systems could already be indefinitely authorized (SEG aviary, Rihs-Boleg, Globovolg, Kliba Voletage).

The two big retailers Migros and Coop, which sold over 50% of the eggs in Switzerland, informed their Swiss suppliers in **1987** that they would no longer buy eggs from caged hens from them as of 1989. But they still sold foreign cage eggs in 1992. About 95 percent of the imported eggs still came from batteries at the time. Migros and Coop then found farms in Germany and France that supplied barn eggs, so that supermarkets stopped selling eggs from caged hens in 1996 (see Figure 30).

Poultry farmers' organizations stopped protesting until 1991 because with the aviaries practicable alternatives were available.

In the **early 1990s**, the poultry industry promoted the Swiss egg and achieved an increase in market share in the following years (from 62 % in 1991 to 72 % in 1997) (see Figure 29).

The feared decline in domestic egg sales did not occur. With egg consumption falling overall, the domestic share increased and the share of battery eggs decreased.

In **1990**, a lot of NGO launched a popular initiative to codify the aims for a agriculture in the Federal Constitution which is animal-friendly, ecological, and in line with market requirements. In the end, it

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<sup>5</sup> see Fröhlich & Oester 1989, 2001, Oester & Fröhlich 1986, Wechsler & Oester 1998

was accepted by the people in 1996 with 78 percent of the votes. The new Agriculture Act based on this as well as numerous new ordinances passed into law in **1998**.

In **1993**, additional eco-payments from the state were introduced. Those farmers who offer their hens regular exercise (state program RAUS = Regelmäßiger Auslauf ins Freie = regular outdoor exercise) or a covered outdoor climate area (winter garden; state program BTS = Besonders Tierfreundliche Stallhaltung = particularly animal-friendly indoor keeping), receive eco-payments of about half a centime per egg. In 1999, 42 percent of the Swiss hens already had regular exercise (RAUS), and 49 percent at least a winter garden (BTS). 37 percent of the hens lived on a farm that fulfilled both programs and consequently received the sum twice.

The big retailers supported the marketing of eggs from hen keeping with runs or winter gardens, also because of higher margins.

In **1997 / 98** a survey was carried out on 96 farms with laying hens in alternative systems. The study showed good hen performances (Häne et al. 2000).

As early as **2001**, most egg processors also wanted to switch to eggs from alternative farming systems.

Egg production continuously increased since end of 2000s (Figure 31).

In the last twenty years, share of barn eggs decreased in the retail trade, and of free-range or organic eggs increased (Figure 33).

In 2018, 30 % of hens are kept in flock sizes between 12,000 and 18,000 (Figure 32).

**In summary**, the success of the phasing-out of cages in Switzerland was based on the following factors:

- Change in the orientation of agricultural policy towards more sustainable production
- Limitation of the number of laying hens to 18,000 per farm
- Scientific comparisons of different husbandry systems (including cages)
- Introduction of a nationwide animal welfare law in 1981 (with a ban on battery cages from 1991)
- Simultaneous introduction of a compulsory testing procedure for housing equipment (tested enriched cages were not approved because of welfare problems)
- Development of new housing systems (aviaries)
- exclusion of eggs from caged hens from the two large food chains (from domestic production since 1992, imported cage eggs since 1996)
- State subsidy programmes for particularly animal-friendly husbandry systems as of 1993

## Austria

In **2020**, 1242 farms with more than 350 places kept **7.12 million laying hens** (61 % barn, 26 % free range, 13 % organic) and produced 2.17 billion eggs. Per capita consumption was 236 eggs, self-sufficiency 90 %. The value added of hen farming was **295 million euros**.<sup>6</sup>

The following description of phasing-out cages is essentially based some key sources<sup>7</sup>.

In **1975** Helmut Bartussek, later deputy director at the Federal Institute for Alpine Agriculture (BAL Gumpenstein), wrote his doctoral thesis on sustainable chicken farming.

In the **1980s**, intensive chicken farming in cages dominated in Austria.

From the **mid-1980s**, the first barn eggs were offered by some supermarket chains.

In neighbouring Switzerland, there were already the first farms with free-range systems (label KAG Freiland).

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<sup>6</sup> <https://www.nutztier.at/daten/#gefluegelwirtschaft>

<sup>7</sup> Niebuhr et al. 2006, Gessl et al. 2020



In **1987**, the Critical Veterinary Medicine Association (Verband Kritische Tiermedizin, VKT) was founded, which awarded a free range label for eggs (Freiland Kritische Tiermedizin geprüft). As a result, many farms with free range or organic eggs were founded, e.g. Toni's free-range eggs (Toni's Freilandeier).

In **1992**, the VKT Association is recognised as an association for organic farming and was renamed the Freiland Association in 1994.

From the **mid-1990s**, the inspection bodies of the animal welfare associations used the Animal Welfare Index (TGI) developed by Prof Bartussek to inspect laying hen farms.

As early as **1993**, all federal states agreed to enact regulations also for alternative laying hen husbandry in addition to cage rearing.

In **1994**, the supermarket chain Billa stopped selling eggs from caged hens. The higher prices for barn eggs also favoured sales of the even more expensive free-range eggs.

In **1994**, the Institute for Animal Husbandry and Animal Welfare was founded at the Veterinary University of Vienna. The director, Prof Troxler, was previously head of the testing centre for poultry in Switzerland. His assistant, Dr Niebuhr, carried out many projects on laying hens, also for the improvement of alternative husbandry systems.

In **1996**, 84 % of hens were kept in cages, 10 % in barns and 6 % in free-range, altogether 4.6 million hens (EU Commission 1998<sup>8</sup>).

Since **1999**, the control of alternative laying hen husbandry has been carried out by a central body (Kontrollstelle Artgemäße Nutztierhaltung), supported by three animal welfare associations (Label tierschutzgeprüft = welfare approved).

In the **early 2000s**, management recommendations for reducing feather pecking were developed based on a research project.

Before the Federal Animal Protection Act came into force in 2005, animal protection was a matter for the federal states. In **2001** cages were already banned in 5 of 9 federal states (Vienna, Tyrol, Vorarlberg, Salzburg and Carinthia).

Already in **2003**, before the ban on cage rearing, about one third of the hens were in alternative housing systems. Almost all farms with alternative husbandry systems participated in brand programmes (KAT or Tierschutzgeprüft).

In **2004**, pictures were secretly taken at numerous cage farms, which caused quite a stir in the public. As a result, animal welfare organisations filed criminal charges against these farms.

The animal welfare organisations then put pressure on the trade to stop selling eggs from caged hens.

According to the new Austrian Animal Welfare Act (BGBl. I Nr. 118/2004), battery cages were banned from 2009, three years before the EU. Enriched cages built before 2005 could be operated until end of 2020.

Some regulations for alternative housing systems are also stricter than in the EU (e. g. 20 vs. 15 cm perch length, 7 vs. 9 hens per m<sup>2</sup> in barns, 8 vs. 4 m<sup>2</sup> free range area resp. 10 vs. 4 m<sup>2</sup> for organic hens, minimum 20 lux, maximum of 24 000 in one housing unit) (see 1. Tierhaltungsverordnung, BGBl. II Nr. 485/2004).

In **2006**, a self-evaluation checklist for farmers with regard to animal welfare was published by the Ministry.

As of **2007**, cage eggs were no longer offered in the supermarkets.

From **2005 onwards**, under the leadership of the Central Working Group of the Austrian Poultry Industry (ZAG), the "Value Added Package Austria" (Mehrwertpaket, AMA-Gütesiegel<sup>9</sup>) for eggs was implemented step by step:

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<sup>8</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:51998PC0135&from=EN>

<sup>9</sup> <https://www.sneg-online.at/mehrwertpaket/>

- 2005 no more beak-trimming
- 2009 ban of battery cages
- 2010 GMO-free feed
- 2014 conversion of feed soya sources to GMO-free Donau soya
- 2012 traceability of the eggs from store to farm via the "Austrian Egg Database"
- each farm must be a member of the Austrian Poultry Health Service
- reduction of antibiotic use by half since 2014
- Ban on beak trimming
- Egg labelling on the farm
- Introduction of Poultry Health Data - Animal Health 2021
- Thanks to the Austrian salmonella control programme, AMA Quality Seal certified eggs have one of the lowest incidences of salmonella in the EU.

The AMA Quality Seal is an officially approved quality mark and is awarded by AMA Marketing. More than 90 % of the eggs on the market bear this seal.

Only Austrian shell eggs are sold in the Austrian food retail trade. The significantly higher standards of domestic laying hen husbandry are supported by the trade.

Since **2020**, there are no more cages in Austria. This makes Austria the first EU country to ban cages completely.

"The pioneering achievement is based on a combination of the work of visionary, communicative personalities in animal welfare, in agricultural practice, in trade, in science, in politics and in business. This solidarity made it possible to develop binding industry solutions on the basis of clear and easily communicable marketing standards." (Gessl et al. 2020)

Overall, Austria has managed to maintain and expand comparatively small-scale laying hen husbandry with these special quality requirements.

The laying hen population, the number of farms keeping laying hens and the egg revenues achieved have developed positively since Austria's early phase-out of cages.

After the ban on cage farming, the self-sufficiency rate for eggs developed positively (Figure 35), despite an increase in per capita consumption from 232 to 240 eggs from 2009 to 2019 and an increase of Austrian population. The number of hens rose from 5.1 in 2009 to 6.9 million in 2019 (increase of 35 %).

Hens in alternative systems increased while hens in enriched cages decreased (Figure 37). In recent years, percentage of hens in barns has been slightly decreasing, while free-range and organic share has been increasing (Figure 34).

In 2019, barn eggs cost 20 cent, free-range eggs 29 Cent and organic eggs 40 Cent (Figure 38).

In 2015, the organic sector agreed to raise all male chicks from organic laying hens.

**In summary**, the success of the phasing-out of cages in Austria was based on the following factors:

- Increase in free-range farms from the beginning of the 1990s onwards
- Early establishment of guidelines for alternative husbandry
- First delisting of eggs from caged hens by a supermarket chain in 1994
- Research to improve alternative systems (e.g. reduction of feather pecking)
- Education on animal welfare problems in cage farms by animal welfare organisations
- Introduction of a national animal welfare law and corresponding regulations in 2004 (with a ban on battery cages from 2009 and on enriched cages from 2020 at the latest)
- Aiming Austrian egg production at "added value" (e.g. stricter animal welfare regulations for alternative systems than in the EU, ban on GMO feed, regional soy, stop beak trimming, prescribe animal health programme). More than 90 % of eggs bear the AMA seal of quality.

## Germany

### Overview

#### Milestones:

- 1972: Animal Protection Act (Tierschutzgesetz) of the Federal Republic of Germany enacted
- 1973: Prof Grzimek criticises cage rearing as concentration camp husbandry (KZ)
- 1974: Expert opinion commissioned by the Federal Ministry of Agriculture on animal welfare in cage farming: no unanimous opinion among the experts
- 1981: "Celler Bible" (final report on the comparison of different husbandry systems: no clear preference for one system)
- 1985: EU: Start voluntary labelling of eggs from alternative husbandry systems
- 1986: EU Directive on laying hens
- 1989: Regulation on the protection of laying hens kept in cages (Hens Husbandry Ordinance)
- 1990: 90 % of hens in cages
- 1999: New EU directive on laying hens
- 1999: Federal Constitutional Court (Bundesverfassungsgericht) ruling: Hens Husbandry Ordinance invalid
- 2002: Inclusion of animal welfare as a state objective in the Basic Law
- 2002: Animal Protection Ordinance (Tierschutzverordnung): Ban on all cage rearing from 2007 onwards
- 2004: Compulsory labelling of all eggs (also from caged hens)
- 2004: Discounter Aldi Nord starts to delist eggs from caged hens
- 2006: Animal Protection Ordinance: Permission for enriched cages (small group housing) until 2020, extended transitional periods for conventional cages (until 2008 / 2009)
- 2006: Lawsuit against enriched cages at the Federal Constitutional Court
- 2008/09: Caged eggs delisted by almost all supermarket chains
- 2010: 18 % of hens in enriched cages (small group housing)
- 2010: Federal Constitutional Court rules that small group housing do not comply with the Constitution and are therefore invalid
- 2015: Federal Council (Bundesrat) decision: phase-out of small group housing by the end of 2025 (in exceptional cases by the end of 2028)
- 2021: only 5 % of hens left in small group housing (2.653 million places)

#### **Favourable factors** for the (long-lasting) phase-out of cage farming in Germany were:

- Campaigns by animal welfare organisations
- Increasing consumer demand for alternative eggs
- Labelling of the housing systems on the eggs
- Willingness from neighbouring countries (especially the Netherlands) to produce and export alternative eggs
- Critical assessment of cage farming by parts of the scientific community (especially farm animal ethology)
- Willingness of retailers to phase out eggs from caged hens (also because of higher profit margins)

#### **Inhibiting factors** were:

- Strong resistance from the poultry industry
- Hesitant action by agricultural policy-makers (conservative parties in particular)
- Resistance from parts of the scientific community (especially livestock science, veterinary medicine)

The caging of laying hens was the prime example for the discussion on animal welfare in livestock farming in Germany. It arose parallel to the emergence of ecological issues in the 1970s such as forest dieback, the hole in the ozone layer or nuclear power. The debate was sometimes very heated between the various parties involved.

## The sixties

After the Second World War, the consumption of food of animal origin rose sharply in the Federal Republic of Germany (FRG). Between 1951 and 1966, per capita consumption of eggs almost doubled (from 134 to 248 eggs; Wittmann 2017).

At the end of the 1960s, cage farming of laying hens became established on a large scale. The main arguments were hygienic improvements due to the absence of contact between hen groups, full automation through egg collection, feed and manure belts, which in turn were supposed to make the farmers' work easier, and the ease with which the hens could be checked in the cage. Thus, the proportion of hens in cages rose from an estimated 15 to 50 percent in the second half of the 1960s in the FRG.

The 1960s also saw a strong intensification of poultry production in the **GDR**<sup>10</sup>. Laying hens were kept in cages in large state-owned or cooperative farms (LPG, VEG, VEB, ZGE, ZBE). Large flocks were built up near the big cities ("Industriemäßige Tierproduktion"). Some KIM reached up to one million laying hens or 1.6 million broilers. Standard barns contained 28,000 hens in three-tier cages or 38,000 hens in four-tier cages (5 hens per cage, 400 cm<sup>2</sup> per hen). But almost half of the hens in the 1980s were still in private flocks with up to 100 hens in free range. The private owners were able to sell the eggs to central offices. In 1989, 24.5 millions of hens were kept. Per capita consumption reached about 300 eggs in the 1980s (305 in 1989). As production was higher than consumption, eggs could be exported, but often at dumping prices.

## The seventies

The gradual awareness of environmental issues that had developed in the early 1970s as a result of the visibility of the consequences of rapid industrial expansion, ignited primarily by water and air pollution, was undoubtedly one of the foundations for the inclusion of animals in this perspective a few years later.

The first **Animal Protection Act** of the Federal Republic of Germany was passed in 1972. Until then, the Reich Animal Protection Act of 1933 was still in force, which generally prohibited animal cruelty, for example. The new Animal Protection Act came into being against the background of the emergence of intensive animal production. It enshrined the responsibility of humans for the animals they kept. Behaviourally appropriate housing was also already required. The explicit aim was to reconcile ethical, scientific and economic interests. It also empowered the legislature to issue special implementing ordinances, for example on farm animal husbandry.

With regard to the further course of development, it should be taken into account that animal welfare at the federal level in Germany is traditionally located in the Ministry of Agriculture. In principle, therefore, there can be conflicts of interest in that the Ministry feels obligated to the interests of farmers.

On 13 November 1973, Prof. **Bernhard Grzimek**, the then extremely popular director of Frankfurt Zoo, addressed the chicken in his weekly TV series "Ein Platz für Tiere" (A Place for Animals) and sharply attacked caging. This criticism reached a mass audience, as the programme was broadcast on the main evening programme and achieved viewing figures of over 70 %.

His programme on cage farming was the starting point for the beginning of a discussion on the relationship between humans and farmed animals on a broad media level and also coined the term "factory farming" in this context. Bernhard Grzimek studied veterinary medicine and wrote both his dis-

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<sup>10</sup> for poultry production in the GDR see e.g. Pingel 2008, Poutrus 2002, Brade 2014, Stock 2014

sertation and his habilitation thesis on the domestic chicken. He later became known for his commitment to the Serengeti in Africa.

Grzimek even described the keeping in battery cages as concentration camp keeping or concentration camp eggs ("KZ-Eier"). As a result, farmers sued him. The courts, however, considered the terms permissible.

In order to be able to fill out the Animal Protection Act with an ordinance on the keeping of laying hens, the BML appointed a **commission of scientists** at the beginning of the 1970s. It was to draw up a corresponding expert opinion entitled "Animal Welfare in Farming Poultry in Modern Husbandry Systems". While 15 experts from poultry breeding research considered cage rearing system to be in conformity with animal welfare standards, the three behavioural scientists involved did not agree with this assessment. As the two groups could not agree, they published their reports separately.

The discussion about the caging of the chicken expanded in the course of the 1970s into a general discussion about intensive animal husbandry in agriculture. The representatives of the associations reacted with a fierce defence of cage rearing.

Gradually, as the debate on animal welfare progressed, the need for the contributions of **behavioural science** was recognised, to which the scientific upgrading of the discipline as a result of the award of the Nobel Prize to the ethologist Konrad Lorenz in 1973 had contributed.

The question of how laying hens should be kept increasingly became a debate between behavioural ethology and poultry breeding research. The latter sometimes accused the former of working unscientifically. The objectivity on the one side was contrasted with emotionality on the other, which was intended to underline the lack of seriousness of the opponents of cages.

Grzimek also attacked the responsible Federal Minister of Agriculture, Josef Ertl (CSU). The political decision-makers then felt compelled to justify their previous funding policy. They referred to the new Animal Protection Act.

Urged on by the equally popular animal filmmaker Horst Stern, the BML made a second attempt and commissioned the Federal Research Centre for Agriculture, Institute for Small Animal Breeding in Celle, to carry out a major project to compare the three husbandry systems cage, barn and free-range. The extensive research ran from 1976 to 1980 and the results of the comprehensive report (655 pages) were also referred to as the "**Celle Bible**" (Anonymous 1982). Overall, cage rearing was found to have economic and hygienic advantages, but disadvantages in the area of animal behaviour. The Swiss behavioural scientist Prof Beat Tschanz was commissioned by the BMEL to make an overall assessment of the results. In his summary in 1981 he wrote: "No further survey is needed to justify the ban of this housing system. The laying hens' ability to meet their needs is limited to such an extent that relevant suffering and damage are inflicted on them".

However, since neither the Commission's report nor the Celle studies came to a clear position against cage rearing, there was initially no legal regulation, although this had been demanded for a long time, also by farmers, in order to obtain legal certainty.

In the course of the 1970s, there were various break-ins into hen houses and subsequently criminal charges against the farmers by animal welfare organisations. This led to a further hardening of the fronts. Therefore, the poultry industry itself demanded that an ordinance be issued so that they could be sure that their keeping was legal.

There were numerous **court decisions** in the 1970s and 1980s (reviewed v. Loeper 1988). In most cases, the cages were considered to be cruel to the animals and to cause lasting and considerable suffering in the sense of the Animal Welfare Act. However, there were no consequences against the animal owners because they could not have recognised the criminality of their actions and the construction of the stables had been approved and subsidised by the state (Hirt et al. 2016).

## The eighties

In the 1980s, **cage rearing** continued to spread in Germany. By the end of the decade, 90% of hens were kept in cages. Cage rearing also favoured the development of large farms (29% of hens in flocks over 50,000 in 1977, 52% in 1996, 63% in 2001) and thus the displacement of smaller keepers who could no longer keep up for economic reasons. A spatial concentration of German poultry farming in Lower Saxony had already begun in the 1960s and subsequently continued. In the 1980s, more than one third of German laying hens were kept there.

Drafts for a regulation on cage rearing from the early 1980s were postponed because developments at the EU level were to be awaited.

In 1986, the Animal Protection Act was amended for the first time. The justification stated, among other things, that the objectives of 1972 had not yet been fully realised in the field of agriculture either. The ethical orientation of the law was strengthened once again.

In 1986, the Council of Europe's recommendations on laying hens were published.

In 1987, the Federal Supreme Court dismissed an appeal against a judgement of the Regional Court of Darmstadt, which had found that cage rearing was not punishable.

Shortly afterwards, the Federal Ministry of Agriculture issued the **Ordinance on the Protection of Laying Hens Kept in Cages** (Minister Ignaz Kiechle), which came into force on 1 January 1988. This also served to implement the EU Directive of 1986 (Council Directive 86/113/EEC of 25 March 1986 laying down minimum standards for the protection of laying hens kept in battery cages). From then on it was legal to keep hens with a space of only 450 cm<sup>2</sup> (i.e. 22 hens per m<sup>2</sup>).

In 1990, the federal state of North Rhine-Westphalia, supported by the federal state of Lower Saxony, applied to the Federal Constitutional Court for a review of the validity of the German laying hen regulation. However, the judgement was not to be made until 1999 (see below).

## The nineties

Since 1985, the European Union has allowed voluntary **indications of eggs** for four alternative husbandry systems on eggs (free-range, semi-intensive, deep litter, perchery (barn)). This encouraged a steady increase in consumer demand for alternative eggs in the 1990s (see Figure 20 in the appendix).

In the 1990s, there was increased **research on alternative housing systems** for laying hens. This was important to test and improve the viability. In 1997-1999, KTBL carried out pilot projects on alternative husbandry methods with scientific support (funded by BMEL; see KTBL 2002). In the federal state of Hesse, corresponding model projects had already been funded before (1993-1996) (Fölsch et al. 1997).

In 1992 Prof Fölsch published a book on species-appropriate chicken husbandry. In 1998, KTBL published an overview of alternative systems (Bessei & Damme 1998) and in 2002 on free-range systems for laying hens (Hörning et al. 2002). In addition, studies on the economics of organic egg production were published (Hörning & Ingensand 1999) (compare also LfL 2004).

In 1998, the EU Commission published a report on laying hens and proposals for a **new EU-directive** on laying hens. This came into force in 1999 (1999/74/EG). It contained a larger space allowance in battery cages (550 instead of 450 cm<sup>2</sup>) from 2003 and a ban on battery cages and minimum requirements for enriched cages from 2021 (e.g. Appleby 2003).

The provisions of the Directive had to be transposed into national law by the member states by 1.1.2002.

Hörning and Fölsch (1999), assigned by the Commissioner for Animal Welfare of the Federal State of Hesse, gave an overview of the results published up to that time and came to the conclusion that

animal-friendly husbandry was not possible in enriched cages. An abridged version of the study was also published in the Journal of Official Veterinarians.

The **judgement of the Federal Constitutional Court** of 6 July 1999 declared the German Hens Husbandry Ordinance of 1987 null and void. In particular, the court demanded sufficient space for undisturbed simultaneous resting or feeding, which was not possible with an area of 450 cm<sup>2</sup> or 10 cm trough length per hen. The court found this to be a violation of § 2 No. 1 of the Animal Welfare Act. It also listed other needs of the hens (scratching and pecking, undisturbed and protected egg-laying, grooming, e.g. sand bathing, sitting on raised perches).

## The noughties

The 2000s were a decisive decade for banning cages. Therefore, a somewhat more detailed presentation is given here. First, all cages were banned by the Green Ministry of Agriculture in 2002 (including enriched cages, as early as 2007), then enriched cages were allowed again by the Conservative Ministry of Agriculture in 2006 and the deadlines for battery cages were extended to the end of 2009. Contrary to expectations, by the end of 2009 most farms switched to barn systems rather than enriched cages (see Figure 9 - Figure 11).

## Political developments / industry action

On 24.1.2000 the BML presented a draft of a new regulation on the keeping of hens (Minister Karl-Heinz Funke, SPD). This was almost identical to the EU directive (exception 12 instead of 10 cm feeding space).

In January 2001 there was a change in the Ministry of Agriculture (in the context of the BSE crisis). The new Minister Renate Künast from the Green Party wanted to bring about a change in agricultural policy ("Agrarwende"). This included the abolition of cage farming. In June 2001, she presented a draft for a **new regulation on the keeping of hens**. This was adopted by the then Red-Green dominated Federal Council in October and came into force on 13 March 2002.

The transitional periods for conventional cages were shortened to the end of 2006 and for enriched cages to the end of 2011. From then on, a minimum height of 2 metres (which de facto made cage housing impossible) and a minimum area of 3 m<sup>2</sup> as well as a maximum of 9 hens per m<sup>2</sup> applied to all housing facilities.

In 2002, the Ministry of Agriculture launched a programme to promote animal-friendly husbandry methods with the explicit aim of converting cage rearing to alternative forms of husbandry. In addition, research projects on alternative housing systems were initiated.

However, the **poultry industry** had already tried to prevent the new regulation.

In 2001, the Federal German Egg Association (Bundesverband Deutsches Ei, BDE) was founded as a lobbying association, also in an effort to combine forces against the ban.

In April 2001, a study on legal requirements for transitional periods in laying hen husbandry (Prof Robbers, Univ. Trier) was distributed to the federal states.

In June 2001, a **study by the University of Vechta** on the possible effects of the new regulation was published on behalf of the Lower Saxony poultry industry (updated Jacobs & Windhorst 2003). It predicted that the cage ban would lead to a drop in self-sufficiency in eggs to 35% with a drop in production of 6 billion eggs, a loss of income for the supplier industry of 1.1 billion D-marks and a loss of 4,700 jobs. In order to maintain animal numbers at the current level, 1.83 billion D-marks would have to be invested in chicken houses (Windhorst & Böckmann 2001, p. 35).

In 2001, the poultry industry created the terms "small group housing" or "small aviaries" for enriched cages, obviously in an effort to avoid using the term cage. The Minister of Agriculture of Lower Saxony, Hans-Heinrich Ehlen, presented a manufacturer's cage (Big Dutchman) to the public.

At the suggestion of agricultural organisations, the BML had already decided in 2000 to carry out pilot projects on enriched cages. The Federal Research Centre for Agriculture (FAL) was commissioned with the participation of the University of Veterinary Medicine Hanover (TiHo). Four manufacturers installed enriched cages on six farms. The final report was presented in 2004 (Anonymous 2004).

In November 2002, the Lower Saxony Ministry of Agriculture also commissioned the University of Veterinary Medicine Hanover to carry out a survey of health and other parameters on farms with different types of housing ("**EpiLeg Study**"). Reports on the results were published in 2003 and 2004 by Kreienbrock and co-authors. They showed, for example, higher losses in alternative systems than in cages. Scientists organized in the International Society for Farm Animal Husbandry (IGN) criticised the study because it was based only on questionnaires and distributed by the industry itself (see also Staack & Knierim 2003). Furthermore, Aerni et al. (2005) showed in a meta-analysis of published data that mortality was not higher in aviaries than in cages.

In autumn 2003, several laying hen farms filed a **constitutional complaint** against the Hens Husbandry Ordinance with the Federal Constitutional Court because they felt that their fundamental rights under Article 12 (freedom of occupation), Article 14 (freedom of property) and Article 3 (principle of equal treatment) had been violated. However, the Federal Constitutional Court unanimously decided in October 2004 not to accept the constitutional complaint as it was inadmissible.

The election victory of the Conservatives (CDU) in the federal state of Lower Saxony in March 2003 changed the majorities in the Federal Council. The latter then demanded an extension of the transitional periods for conventional cages and the approval of "small aviaries". Several times these demands were linked to an approval of the revision of the Pig Farming Ordinance, which had already been urged by the EU.

In March 2004, the Conference of Agriculture Ministers of the German Federal States held in Osnabrück called on the Federal Ministry of Agriculture to present key data for a so-called "small aviary" by the next conference in October. This compromise formula was called the "Osnabrück Chicken Peace" in the press (in reference to the historic Peace of Westphalia).

However, the compromise **model of a small aviary** with a height of about 1 m (designed at the Federal Institute for Animal Welfare and Husbandry in Celle) proposed by Minister Künast in the summer of 2004 was rejected by the poultry industry (certainly because of economic reasons) and also by the Conference of Agriculture Ministers. However, the draft was also criticised by farm animal ethologists (e.g. Hörning 2004, 2005).

Then, in December 2004, the Federal Council decided to soften the ban on keeping laying hens in cages as of 1 January 2007 with the new Animal Welfare and Production Animal Husbandry Ordinance and to allow enriched cages. The Minister of Agriculture, however, did not agree to this, so that the planned ban on cage rearing continued for the time being.

In April 2006, the Federal Council again decided to end the ban on cages for laying hens. Previously, in November 2005, the federal government had changed from red-green (SPD / Social Democrats, Greens) to black-green (CDU / Conservatives, SPD).

The new Federal Minister of Agriculture, Horst Seehofer (conservative party CSU, since Nov. 2005) then signed the 2nd amendment to the Ordinance on the Welfare of Farm Animals in October 2006. Despite the transitional periods for conventional cages already known since 2002 (valid until 2006), these were further extended, until the end of 2008 and under certain conditions even until 2009. However, this was still three years before the ban at EU level (end of 2012).

Furthermore, enriched cages were allowed until 2020 as so-called "**small group housing**". The term "enriched cages" did not even appear in the regulation! The cages had to have a minimum area of 2.5 m<sup>2</sup>. Furthermore, higher space offers also applied to most individual dimensions (see Table 2).



**Table 2: Comparison of enriched cages according to the EU Directive and German small-group housing**

	<b>EU-Directive</b>	<b>Germany</b>
Minimum <b>cage area</b> (cm <sup>2</sup> )	2000	25,000
Minimum cage area per hen (cm <sup>2</sup> )	750	800 900 hens > 2.0 kg
Minimum <b>cage height</b> (cm)	45	60 at the front, 50 at the back
<b>Feed trough</b> length per hen (cm)	12	12 14.5 hens > 2.0 kg
Minimum <b>nest area</b> per hen (cm <sup>2</sup> )	-	90
Minimum <b>scratching area</b> per hen (cm <sup>2</sup> )	-	90
<b>Perch length</b> per hen (cm)	15	15 at least 2 perches in different heights

In the explanatory memorandum of the law of June 2006 it was stated that with the stricter requirements than in the EU Directive, the concerns regarding the ethological needs of the hens had been taken up. Furthermore, smaller farms that could not convert to barn management were to be given the opportunity to keep hens in small groups. And large farms should be prevented from moving abroad. Despite intensive advertising and the offer of support measures, about 78% of hens are still housed in conventional cages.

At that time, additional costs of about one cent were calculated for small group housing compared to conventional cages (1.0 cent, Schierhold 2006, 0.9 cent, Simon & Krafeld 2009; 1.2 cent, Damme 2008) (see Table 10, Table 11).

As early as November 2006, the state of Rhineland-Palatinate decided to file a new lawsuit with the Federal Constitutional Court against the keeping of laying hens in cages. The application was submitted in June 2007, later supplemented by scientific expertise (Hörning 2009, Keppler 2009). The Federal Constitutional Court then asked a number of organisations, including the poultry industry and animal welfare, to comment on the complaint.

Already with the enactment of the new regulation, the BMEL announced **research projects** also on small group husbandry. Subsequently, two large research projects on the further development of small group husbandry were initiated in a network of several institutes under the leadership of the Federal Institute for Animal Welfare and Husbandry in Celle. The studies ran from 2008/2009 to 2012 (final report BLE 2013).

From 2002 to 2004, however, there was also a research project in southern Germany on alternative husbandry systems on 34 practical farms (LfL 2004), in which various problems, but also approaches for improvement, were identified.

### **Developments in the retail sector**

Parallel to the described controversial developments at the regulation level, however, there were also strong **changes at the retail level**.

Already at the beginning of the 2000s, the demand for alternatively produced eggs had risen sharply, especially because discounters such as Aldi began to market free-range eggs. As a result, the prices for free-range eggs also fell (see Figure 21).

Since EU marketing standards (0 = organic production, 1 = free-range, 2 = barn, 3 = cage-reared) have required mandatory labelling of eggs from cage-reared hens since 2004, the demand for alternative eggs continued to rise (see Figure 20).

The demand increased despite the fact that the alternative eggs were significantly more expensive (see Figure 21). In 2007, for example, consumer prices for eggs of weight class M were 9.4 ct./egg for

eggs from caged hens, 12.2 ct./egg for barn eggs and 15.3 ct./egg for free-range eggs (see below). In relation to the eggs from caged hens, these were surcharges of 29.8% and even 62.8% (barn and free-range eggs respectively).

Since 2002, five animal welfare organisations had joined forces in the initiative "Acting<sup>11</sup> with Conscience" and started talks with retailers with the aim of delisting eggs from caged hens. The German Animal Welfare Association was also active in this regard. The initiative "Germany goes cage-free" was launched by the Albert Schweizer Foundation in August 2009. Together with 12 other animal welfare organisations, it is still campaigning for the delisting of eggs from caged hens from the retail trade, including in processed products.

The large discounter Aldi Nord began to delist eggs from caged hens as early as 2004, surely also with a view to the future ban on cage farming. The discounter Plus followed in 2005. In Austria, most chains had already delisted eggs from caged hens by mid-2006, including those operating in Germany such as Rewe, Lidl and Plus. By 2008, almost all German supermarkets had phased out eggs from caged hens. The companies claimed that they were responding to the wishes of their customers. Another reason, besides the pressure from animal welfare organisations and the continuously increasing demand for alternative eggs, was that eggs from German small group farming still had to be declared as cage eggs. The German government had apparently tried in vain at the EU level to enforce a separate labelling for these eggs (No. 4).

Moreover, various authors pointed out that the trade had a higher profit margin with alternative eggs and thus profited from the delisting of eggs from caged hens (Damme 2008, Hörning 2009). In 2007, for example, the trade margin increased significantly from cage-reared (1.9 cents) to barn-reared (2.2 cents) to free-range (4.3 cents).

The farmers' associations sharply criticised the trade's delisting campaigns ("discrimination against small group husbandry") and warned of a further decline in German egg production. In 2008, State Secretary Lindemann from the Agricultural Ministry also called on the food trade to give small group husbandry a chance.

## Reactions of farmers

How did laying hen **farmers react** to the described, partly opposite developments during this decade?

In **summary**, it can be stated:

- Most farms applied for exemptions for extended use of battery cages until the end of 2008 or even until the end of 2009.
- In several cases the competent authorities (district veterinary offices) had to become active to ensure that the hens were then released on time (until end of 2009).
- In the narrower conversion period, the number of notifiable farms (more than 3000 places) and thus the number of hen places initially decreased significantly in 2008 and 2009 (see Figure 9, Figure 10). This decline can be explained by the necessary construction measures.
- However, the number of hen places rose again in 2010 / 2011 to about the same level as before (see Figure 9, Figure 10). The feared permanent slump in German egg production thus did not materialise.
- Contrary to expectations, most farms switched to barn management and not to the new German form of enriched cages (small group management) (see Figure 9, Figure 10).
- One main reason for this may have been the announcement by the food trade that they would no longer sell shell eggs from caged hens, not even from the German form of small group housing.

From the German agricultural statistics, annual data are available from farms with more than 3,000 hen places on the number of places and the number of laying hens currently kept, separated accord-

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<sup>11</sup> "Handeln" in German language has a double meaning: Acting and Trading

ing to the different housing systems. Far more than 90 % of German eggs are produced in these flocks (see Figure 18, Figure 19). In this respect, the data are very representative. Thus, for the narrower period of the conversion of conventional cages, the development of farms and hen places in the different husbandry systems can be shown, e.g. the strong decline in cage rearing and the strong increase in barn rearing. However, these figures do not show how many farms stopped egg production completely or how many farms started keeping laying hens for the first time. It is also not clear whether farms that continued to keep laying hens continued to use existing buildings or built new ones. These aspects will be examined in more detail in the following.

At the end of 2006, most farms applied for the **derogation to extend the use of battery cages** until the end of 2008, and many later also until the end of 2009. As shown in detail in the graphs in the appendix, production initially declined until the mandatory ban on conventional cages at the end of 2008 (or with exceptions at the end of 2009). This was also related to the necessary construction measures. The installation of new housing systems in existing old buildings takes time, even more so the construction of new barn buildings. It also takes time to obtain official approval. For existing cage systems, emission control procedures were often necessary when converting to alternative housing methods.

But already in 2011, as many hen places were reported again as at the end of the 1990s (today it is once again significantly more, see section 2010s). The feared relocation of chicken farming abroad had therefore not taken place. Even though some farms stopped production, others obviously saw this as an opportunity to earn an income with a new livestock sector.

Contrary to expectations, however, most farms **switched to floor management** and not to the new small group management (2010 62.8 vs. 18.2 %) (Figure 11). There were certainly several reasons for this:

- The bad image of cage rearing
- The already mentioned delisting of eggs from caged hens by most supermarket chains (as eggs from small groups also had to be labelled as eggs from caged hens)
- The willingness of retailers to pay more for eggs produced in an alternative way
- The increasing dissemination of alternative husbandry systems and thus corresponding experiences in practice
- Positive results from research projects on alternative husbandry systems.

According to statements by the Lower Saxony veterinary authorities, most farms converted existing facilities (cf. LAVES activity report 2009), i.e. did not build new ones. Conversions are normally significantly more cost-effective than new buildings. The KTBL (2015) calculated the costs of conversion to small groups at 10 - 12 € per hen place for three different flock sizes. In comparison, new construction costs for floor housing (aviaries) were 30 - 35 € (see chapter on cost calculations).

It was mainly those farms that had previously marketed to the retail trade (partly via packing centres) that switched to alternative husbandry systems, as the retail trade had discontinued eggs from caged hens. Of the farms that continued to use cages, some smaller farms marketed their eggs directly to end customers and larger ones supplied the egg products industry or sold the eggs abroad (cf. KTBL 2015).

A look at the development of the average flocks, as well as the flock size distribution between 2006 and 2013 shows that farms with caged hens tended to keep larger flocks after the ban on conventional cage farming (see figures in the appendix), e.g. on average 36,252 places in 2006, 42,608 in 2013. This illustrates that especially smaller farms did not continue cage farming.

Also in the federal state of Lower Saxony (40% of all cage places in Germany in 2007), the average number of hen places per farm in small group housing was higher at the end of 2010 (Ø 60.695 places) than before the conversion in 2006 (Ø 42.838 places) or 2007 (Ø 44.751 places). This also shows that mainly larger farms invested in the cages there.

In Bavaria (20.0 % of cage places), 97.7 % of cage places were recorded in farms with more than 30,000 animal places at the end of 2010 (registered in farms with more than 350 places). Thus, there were only 95,879 places in farms with less than 30,000 places.

## The twenty-tens

### Ban on caging

In December **2010**, the **Federal Constitutional Court** announced its ruling on the lawsuit filed by the federal state of Rhineland-Palatinate in 2006. The provisions on small group housing (enriched cages) were declared unconstitutional, mainly for formal reasons (no hearing of the Animal Welfare Commission). However, they were still applicable until the end of March 2012.

In August 2011, the Federal Ministry of Agriculture (Minister Ilse Aigner, CSU) then forwarded to the Federal Council a draft ordinance amending the Ordinance on Animal Welfare and Animal Husbandry (Tierschutz-Nutztierhaltungsverordnung), which would ban the establishment of new small-group husbandry facilities. Existing facilities were to be given a phase-out period until the end of 2035. However, the Federal Council decided in September 2011 not to approve the ordinance in accordance with Article 80(2) of the Basic Law. The disagreement was not about whether small group housing should be phased out. Rather, it was mainly about the fact that some federal states were pushing for a much faster phase-out.

In 2011/12, various expert opinions were obtained on the justification of possible transition periods (KTBL 2011, HNE 2012).

In **2012**, the federal states of Lower Saxony and Rhineland-Palatinate submitted a joint motion that provided for a transitional period until 2023 (in hardship cases until 2025) for the end of small group housing. At the beginning of March, the Federal Council agreed to this compromise. However, Minister Ilse Aigner then announced that she would not announce the Council's decision because of constitutional concerns (transition periods too short). Motions by the SPD and Bündnis 90/Die Grünen parliamentary groups in the Federal Parliament followed, demanding immediate implementation of the compromise, but were rejected by the coalition parliamentary groups (at that time a black-yellow coalition of CDU / Conservatives and FDP / Liberals). Therefore, with regard to caging, since April 2012 there were only general provisions from the Animal Welfare Act and it was up to the official veterinarians how to deal with it.

In July 2015, the KTBL once again presented calculations for the depreciation of the cages. It was not until November **2015** that the Federal Council finally decided to phase out small group rearing by the end of 2025 (in exceptional cases possible until end of 2028), i.e. two resp. three years longer use of the cages than under the 2012 proposal. From April 2016, new small group housing was no longer allowed (due to the minimum requirement of 2 m height for housing facilities).

The Federal Government (coalition at that time CDU / Conservatives and SPD / Social Democrats) then also approved the regulation (published in the Federal Law Gazette in April 2016).

Thus, after the first regulation in 1997, legally regulated cage-rearing in Germany will come to an end with the final phase-out in 2028 after about thirty years.

Since most farms with small group housing had started in 2008/09 and there were hardly any new farms after 2010, the farms have been given considerably more time with the transitional periods now set by law (end 2025/28) than the usual business depreciation period for cages of 10 – 15 years.

In the same period (first half of the 2010s), the **number of farms** and thus the number of hens in small group cages decreased continuously, and also afterwards until today (see Figure 9 to Figure 11), e.g. 155 farms in 2010, 124 in 2015, 80 in 2020. It is highly likely that no new facilities with small

groups were built in view of the ongoing discussions. According to KTBL (2015), German manufacturers also only produced small group cages from 2000 to 2009 at the most. In parallel, farms with alternative housing systems increased continuously.

### Recent welfare developments

Since 2013, according to § 11 No. 8, all animal keepers must ensure through **self-monitoring** that the requirements of § 2 of the Animal Welfare Act are met (e.g. accommodation appropriate to the animal's behaviour, no excessive restriction of movement appropriate to the species). **Animal welfare indicators** shall be used for this purpose. During inspections, the animal keepers must present documentation.

However, the individual animal welfare indicators are not specified in the law. Recommendable guidelines have been developed for this purpose, such as the KTBL animal welfare indicators for poultry<sup>12</sup> or the MTool for laying hens from the University of Kassel<sup>13</sup>. These guidelines can also serve as a weak point analysis and show the farm possibilities for improvement.

In some federal states, ongoing payments for more animal-friendly husbandry conditions were also granted under the EU co-financed **EAFRD programme**, e.g. in Lower Saxony from 2014<sup>14</sup>. Farmers were not allowed to keep beak-trimmed hens. They had to keep accurate records and have the health of the flock assessed by veterinarians. A benefit of 500 euros per livestock unit (1 GVE = 500 kg) and year for a maximum of 6,000 hens was granted for compliance with the conditions. This meant about 1.70 euros per laying hen and year.

In summer 2015, a voluntary agreement was reached between the Ministry of Agriculture and the poultry industry to end **beak trimming in laying hens**. As of 2017, no more beak-trimmed pullets were housed. Furthermore, calculations were made on the costs of abandoning beak trimming. The sum of additional costs (more expensive pullets, higher feed consumption, employment material, animal health, extra work, barn space) and lost revenue (eggs, higher animal losses) was estimated at 0.891 cents per egg in the Poultry Yearbook 2020, for example. The Ministry of Agriculture has funded corresponding model and demonstration projects on practical farms in which preventive measures have been tested.

Furthermore, there has been a discussion about the **killing of male chicks of layer lines** for some time. The Ministry of Agriculture has funded various research projects on sex determination in the egg since 2008. Since autumn 2018, eggs have been available in various supermarkets with "no chick killing" labels.

After the Minister of Agriculture and the poultry industry could not agree on a definitive phase-out date, a bill introduced by the BMEL to amend the Animal Welfare Act was then passed in summer 2021. Since the beginning of 2022, the killing of chicks has been prohibited and, from the beginning of 2024, sexing after the 6th day of hatching will also be prohibited. As there are hardly any methods for sex determination available on a larger scale so far, male layer chickens are now raised in most cases. There are very different procedures for this (cf. Hörning & Gaio 2022).

Various research projects on the use of dual-purpose chickens (breed or hybrid chickens) have also been funded by the Ministry of Agriculture (overview in Hörning et al. 2021). However, these breeds are still very rare in practice. Since the performance of dual-purpose chickens is significantly lower, the farms would have to realise correspondingly higher prices. In the meantime, however, all large

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<sup>12</sup> <https://www.ktbl.de/shop/produktkatalog/12632>

<sup>13</sup> <https://www.ble-medienservice.de/0049/mtool-eine-managementhilfe-fuer-legehennenaufzucht-und-haltung>

<sup>14</sup> [https://literatur.thuenen.de/digbib\\_extern/dn060829.pdf](https://literatur.thuenen.de/digbib_extern/dn060829.pdf)

poultry breeding companies in Europe offer dual-purpose hybrids. This shows that the companies see a future market here.

In 2019, a law on the introduction of a (voluntary) **state animal welfare label** was passed by the cabinet and ratified by the EU Commission. In 2020, the Ministry of Agriculture still presented the draft of a corresponding implementing regulation. Detailed criteria were initially proposed by the BMEL for pigs. As with the Borchert Commission (see below), the labelling was to comprise three levels above the legal minimum standard.

However, this law did not find a majority in the Federal Parliament before the parliamentary elections in 2021, as the coalition partner SPD demanded mandatory instead of voluntary labelling. Reference was also made to the husbandry labelling that had been introduced by the trade in the meantime.

This is because the trade, i.e. the large supermarket chains, had started its own animal **husbandry labelling** in 2019 (together with farmers organisations), which comprises four levels: 1 (stable husbandry): legal standard, 2 (stable husbandry plus): 10 % more space and additional employment material, 3 (outdoor climate): contact with the outside, 4 (premium): outdoor run or pasture access. However, the husbandry labelling is not a question of awarding a separate label (incl. control), but rather of classifying already existing labels into the four levels. For example, the "Initiative Tierwohl" (Animal Welfare Initiative), which is now widely used for pigs and fattening poultry, corresponds to level 2, the entry-level label of the German Animal Welfare Association corresponds to level 3 and the premium label of the Animal Welfare Association or organic production corresponds to level 4.

For some years now, there has also been a strong discussion about the **restructuring of the entire animal husbandry sector** in Germany.

In a major report in 2015, the Scientific **Advisory Board for Agricultural Policy** at the Ministry of Agriculture described agricultural animal husbandry as unsustainable (WBA 2015). It proposed significant improvements in the area of husbandry for all farm animals, including more space, more occupation, contact with the outdoors, and abandoning mutilations. A graduated labelling of husbandry forms was also proposed. Additional costs of 2.7 - 4.9 billion per year were calculated for these animal welfare measures (of which 44 - 120 million for laying hens and 126 - 299 million for broilers).

The goal of the state animal welfare label was originally to start with poultry in 2021. Damme (2020) modelled corresponding additional costs for a state animal welfare label for laying hens (more detailed calculations in the appendix):

- Reference procedure: 40,000 hens in aviaries, 9 hens/m<sup>2</sup>, beak trimming, 8.36 cents/egg
- Level 2: 8 instead of 9 hens/m<sup>2</sup>, no beak trimming, additional winter garden, additional costs + 2.27 cents/egg
- Level 3: /7 hens/m<sup>2</sup>, winter garden, green run, + 3.61 cents/egg

In 2019, the **Competence Network** for Farm Animal Husbandry ("Borchert Commission") was convened by Federal Minister of Agriculture Julia Klöckner (CDU). In 2020, the recommendations of the commission were handed over<sup>15</sup>. It proposed a three-tier labelling of livestock products above the legal standard (1: stable plus, 2: improved stables, 3: premium), furthermore dates by which certain parts of the livestock sector should be raised to individual levels respectively (last step in 2040: level 2 as legal minimum standard). The additional costs were estimated at 1.3 to 3.6 billion € per year. In 2021, a feasibility study highlighted that the proposed measures are possible from a legal point of view (estimate €2.9 to 4.3 billion per year). Finally, in 2021, a policy impact assessment was carried out by the Thünen Institute on behalf of the BMEL (estimate 2.5 to 3.5 billion € per year), which also looked at possible financing instruments such as different taxes.

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<sup>15</sup> <https://www.bmel.de/DE/themen/tiere/nutztiere/umbau-nutztierhaltung.html>

After protests by farmers due to the low producer prices, Chancellor Merkel appointed the **Commission on the Future of Agriculture** in the summer of 2020, in which the leaders of all participating associations (agriculture, animal welfare, environmental protection) as well as the scientific community were represented. The commission presented its final report in June 2021<sup>16</sup>. In the area of animal husbandry, it proposed to follow the recommendations of the Borchert Commission (i.e. gradual increase to higher animal welfare levels with appropriate labelling), but also supplemented them with its own proposals, e.g. in the area of environmental protection (e.g. stronger linkage of animal husbandry to the area cultivated by the farm).

According to the **coalition agreement** of the new traffic light coalition of SPD, FDP and Greens of December 2021<sup>17</sup>, there is to be a binding animal welfare labelling from 2022. Farmers are to be supported in the conversion of animal husbandry with a financial system supported by market participants. Investment support is only to be provided for higher animal welfare levels. The development of livestock numbers is to be oriented towards the area under cultivation and brought into line with the goals of climate, water and emission protection. Emissions from ammonia and methane are to be significantly reduced, taking animal welfare into account. Farmers are to be supported on the path to climate neutrality as part of the conversion of livestock farming. A testing and approval procedure for mass-produced livestock housing systems is to be introduced. The new Federal Minister of Agriculture, Cem Özdemir (Greens), wants to present a proposal for binding husbandry labelling before the end of the year.

## Development of production and consumption

The most important developments in production and consumption of eggs are briefly outlined in the following. These are documented in great detail in the appendix with many graphs and tables. German **egg production** rose during the 1990s. In the 2000s, production fell steadily in the course of the discussion of an imminent cage ban. Production was lowest in the direct transition period in 2009/2010. After the low in 2010, however, egg production rose steadily again until today (Figure 1). The Federal Republic of Germany has always been an importing country for eggs, also due to the spatial proximity of the Netherlands to larger conurbations, e.g. the Ruhr area. Only in the more direct conversion period of the cages in 2009/2010 did **imports** increase more strongly (Figure 2). Per capita egg **consumption** fell from the mid-1990s to the mid-2000s (from 225 to 205 eggs), but has risen steadily since then (to around 240 eggs today). In parallel, households are buying more and more eggs from the particularly animal-friendly free-range (incl. organic) systems, although these eggs are more expensive. Self-sufficiency, at about 70 % today, is at about the same level as in the mid-2000s. About three quarters of imported eggs come from the Netherlands (Figure 4). With the increase in egg production, the number of **farms and hens** also increased (Figure 7). Today there are almost twice as many farms as in 2010 (2025 vs. 1111) and, with about 50 million places, a fifth more than in the 1990s (in farms with more than 3000 places). Consequently, the feared slump in egg production has not taken place; on the contrary, it is growing continuously. With regard to the distribution of **flock sizes**, there are two different statistics (Table 3). Annual data are published for all farms with more than 3000 hen places. In 2020, 2025 farms had an average of 24,501 hen places (total 49.6 million places). Every 3 - 4 years figures are collected for all farms with at least 5 hectares of land or at least 1000 poultry. In 2020, 46,710 farms had an average of only 1303 places (total 60.9 million places), which shows that there are very many small farms. However, the distribution of the housing systems is about the same in both evaluations.

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<sup>16</sup> <https://www.bmel.de/DE/themen/landwirtschaft/zukunftskommission-landwirtschaft.html>

<sup>17</sup> <https://www.bundesregierung.de/breg-de/service/gesetzesvorhaben/koalitionsvertrag-2021-1990800>

Cage farms had the largest flocks in each case, followed by farms with barn and then free-range systems, organic farms had the smallest flocks (Figure 17). In recent years, there has been a trend towards smaller flocks on free-range and organic farms. This is probably related to new entrants in the market.

From the early 1990s to 2008, the percentage of battery **cages** declined slowly but steadily (from 96 to 62%). With the impending ban on battery cages from 2010, it then fell drastically in 2009 (38%) to 18% in 2010 (small group housing - German type of enriched cages). Since then, proportion has been steadily decreasing slightly (up to 5.5% in 2020) what can be explained by the future ban (Figure 9, Figure 10, Figure 11).

In terms of hen places, barn management dominates today (62 %), followed by free-range (20 %) and organic (12 %). Of the 2025 farms, 80 had cages, 1071 barns, 684 free range and 520 were organic. A closer look at the direct **conversion period** of cages from 2007 to 2009 (using the example of lower Saxony, the biggest state of egg production) shows that almost all farms initially applied for a possible extension of two years for battery cages (until end of 2008). Some of the farms then stopped production despite having applied for a changeover. Others then applied for the maximum extension to three years (until end of 2009). Obviously, most farmers switched to barn eggs.

In 2013, a special evaluation shows, that 52% of all produced eggs were marketed to private households, 32% to food industry and 16% to major buyers (e.g. commercial kitchens and bakeries) (BLE 2021). Data concerning housing systems are only available for eggs bought by consumers.

After the labelling of the farming method on eggs became mandatory, the share of **household purchases** of eggs from alternative systems increased more strongly (Figure 20). With the delisting of eggs from caged hens by supermarket chains in 2009/10, their purchases dropped drastically to 6.6% in 2010 and since then to 0.7% in 2020. In recent years, there has been an increase in free-range and organic eggs (in 2020 almost half of all household purchases), with a corresponding decrease in barn eggs. This shows that consumers are already buying eggs from particularly animal-friendly systems, despite the higher prices (Figure 21).

In 2020, M-size eggs cost an average of 13.6 cents for barn eggs, 19.5 cents for free-range eggs and 33.0 cents for organic eggs. Furthermore, consumer prices differ in the type of shopping places (Table 6). In 2020, an egg cost an average of 16.4 cents at discounters, 23.4 cents at full-range stores, 25.8 cents at the weekly market and 25.7 cents at agricultural producers (average of husbandry types).

The **output value of agriculture** for eggs (quantity of products produced multiplied by average producer prices) increased almost continuously from lows in 2005/06 until today (2005 471 Million €, 2020 1184 Million €) (Figure 24). This is not only due to increasing production, but also to the increasing share of more expensive eggs from particularly animal-friendly systems.

Data are available on egg prices from egg packing centres (Table 8). These roughly correspond to the **producer prices**. On average from 2017 to 2020, Dutch eggs from caged hens paid 6.14 cents per egg and German eggs from caged hens from the Weser Ems region paid 6.58 cents. Dutch floor eggs averaged 6.43 cents and floor eggs from Weser Ems 8.05 cents. Organic eggs cost an average of 27.04 cents. In the South-West region, wholesalers sold barn eggs to retailers for 19.23 cents and free-range eggs for 22.79 cents.

There is only little difference in **egg yield** between types of husbandry (Figure 26). On average from 2015 to 2020, hens from caged hens achieved 300.7 eggs per year, from barn hens 299.1 eggs, from free-range hens 297.0 eggs and from organic hens 288.2 eggs (the lower value for organic chickens can be explained by differences in feeding).

Current **economic evaluations** show that farms with alternative husbandry systems make positive profits (see section Cost calculation in the appendix). In this respect, the higher costs are covered by better prices.



## Appendix

### Development of key data

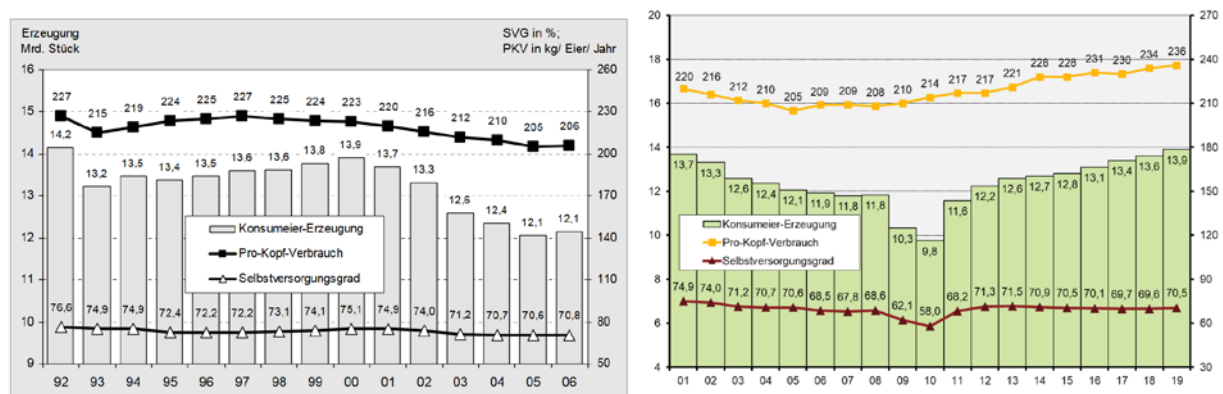
#### Germany

This section describes the development of egg production in Germany over the last 20-30 years. A large amount of key data is available from a number of German sources published annually (see bibliography). In many cases, these data were used to create graphs for this working paper to illustrate the development over the last thirty years.

#### Egg production, import and export

Figure 1 shows **egg production**, per-capita consumption and self-sufficiency in Germany from 1992 to 2019. At the beginning of the 1990s, egg production initially declined due to the closure of former GDR farms. Then it rose again during the 1990s. In the 2000s, production fell steadily in the course of the discussion of an imminent cage ban. Production was lowest in the direct transition period in 2009/2010. After the low in 2010, however, egg production rose steadily again until today.

In **2020**, 14.42 billion eggs were produced according to the AMI market balance. The self-sufficiency rate rose to 71.8 %, per capita consumption to 239 eggs, and the number of laying hens to 49.2 million in farms with more than 3000 places (performance 293 eggs per hen and year). Therefore, egg production today is higher than 30 years ago.



Konsumeier-Erzeugung = table egg production, Pro-Kopf-Verbrauch = per-capita consumption, Selbstversorgungsgrad = self-sufficiency

**Figure 1: Egg production (Billion), per-capita consumption (eggs per year) and self-sufficiency (%) from 1992 to 2019 (LEL Agrarmärkte 2007, 2020)**

Figure 2 shows the **supply balance** of table eggs from 2000 to 2020. The development of production was already mentioned in the previous figure. Consumption declined somewhat in the 2000s and has been rising steadily since then, although increasingly more expensive eggs are being bought from farming methods with more animal welfare.

Imports of eggs were always significantly higher than exports in Germany. Imports increased in the 2000s, but have been declining since 2014. Import demand - and thus the foreign trade balance - was highest in the 2009 / 2010 transition phase (see below).

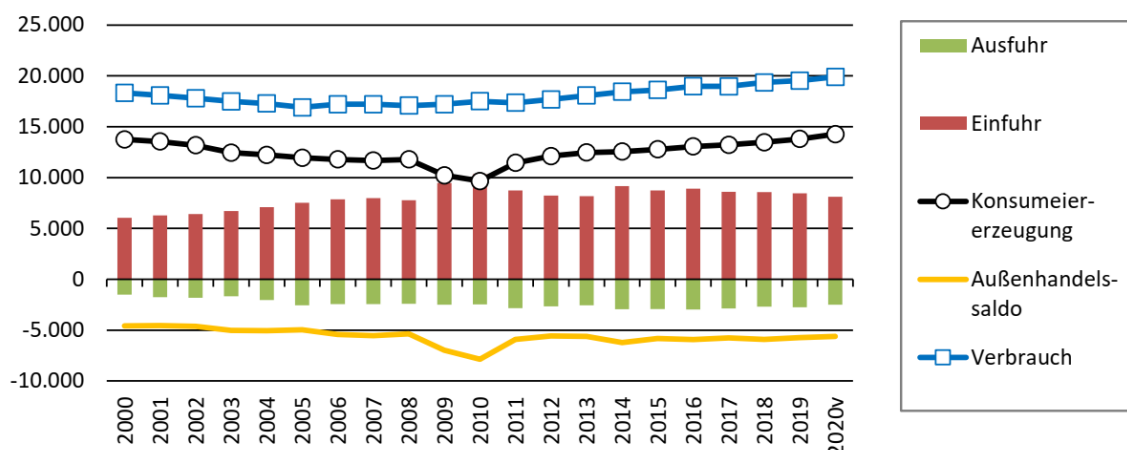


Figure 2: Supply balance for eggs (including egg products) from 2000 to 2020, million eggs (Thünen Inst. 2021)

Figure 3 shows **imports and exports** separately for shell eggs and egg products (the latter converted to shell eggs) from 2009 to 2020. Imports of shell eggs in 2020 were at their lowest level since 2006. Exports of eggs have been falling since 2014, mainly due to stronger domestic demand for eggs. Imports of egg products, on the other hand, have increased since 2014. Exports of egg products declined also. In 2017, imports consisted of 75 % shell eggs and 25 % egg products.

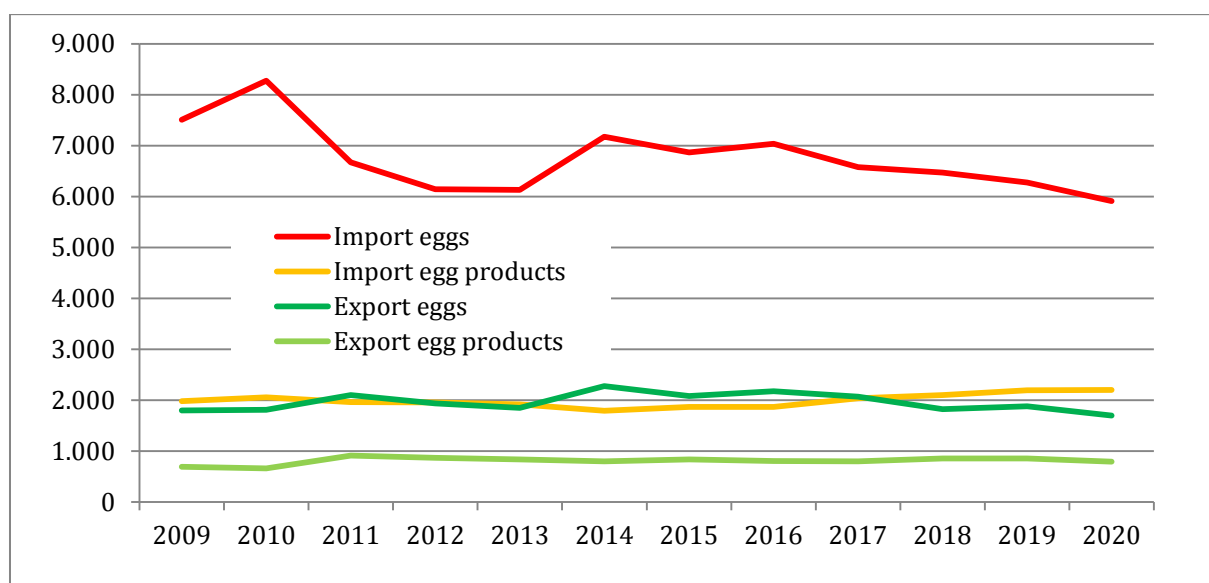


Figure 3: Import and export of eggs and egg products from 2009 to 2020, million eggs (data: BLE 2021)

The main sources of **imports** of shell eggs are the Netherlands (around 75 %), Poland (9.3 %) and Belgium (5.4 %), together 89 % (data for 2020) (see Figure 4).

99 per cent of the imported egg products come from the EU and only one per cent from third countries (Ukraine, USA).

As with imports, the largest buyer of **exported eggs** is the Netherlands (Figure 5). The reasons include historically developed trade links between the Netherlands and Germany and regional proximity. The figures show the developments of imports as well as exports for table eggs, and for each year the five most important countries.

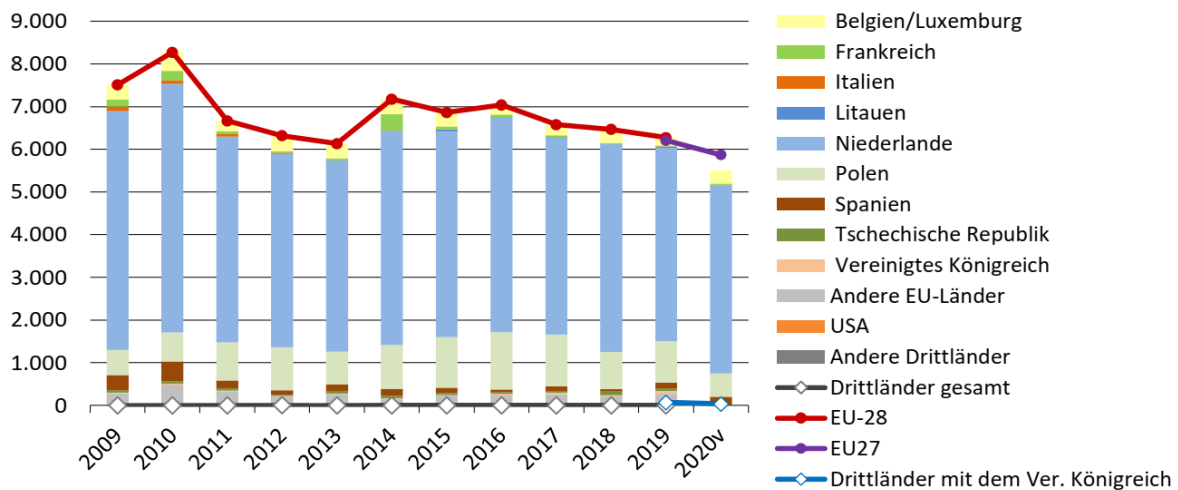


Figure 4: Imports of table eggs and most important supplier countries, million eggs (Thünen Inst. 2021)

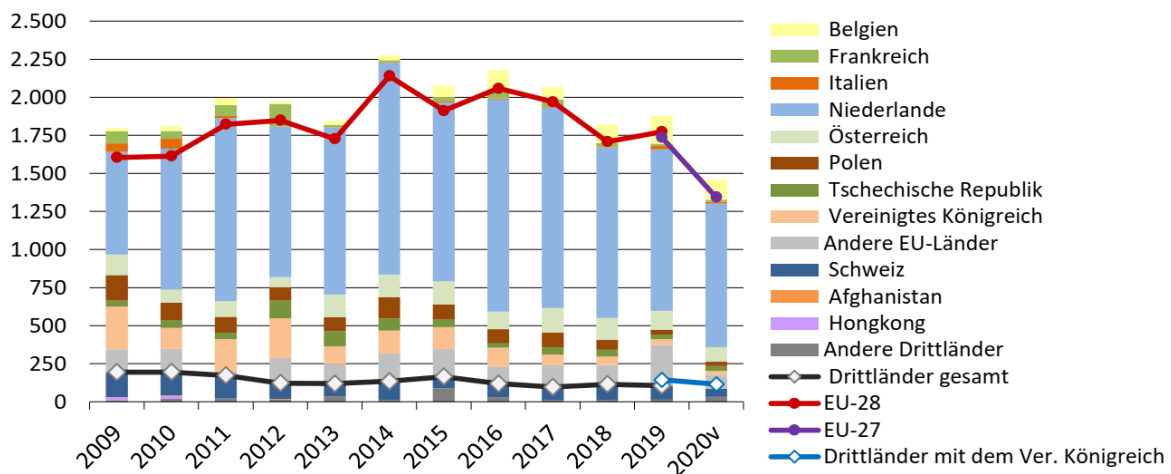


Figure 5: Exports of table eggs and most important consumer countries, million eggs (Thünen Inst. 2021)

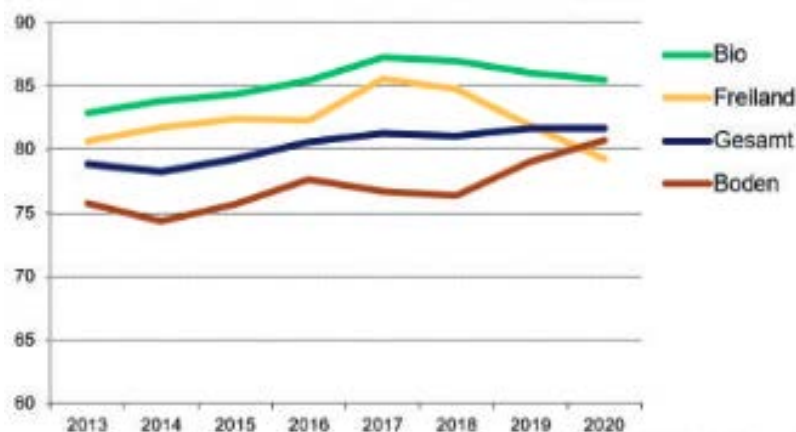
According to the Ministry of Agriculture, in recent years 52% of all produced eggs were marketed to private households, 32% to industry and 16% to large kitchens and bakeries. Some processors now only use alternative eggs for their products and label products accordingly (BMEL<sup>18</sup>). The Albert Schweitzer Foundation's website provides a list of companies that no longer use eggs from caged hens.<sup>19</sup>

Looking at the housing systems, barn eggs purchased by consumers in 2015 to 2010 had the lowest **domestic share** (70-80%), followed by free-range eggs (80-85%), with organic eggs having the highest share at around 85% (household surveys, data from MEG) (Figure 6). This shows that the most frequently purchased eggs are also the most imported.

For the imported shell eggs or egg products, no information on the husbandry systems is available. However, it is known that from the main importing country, the Netherlands, many eggs are imported from all alternative systems and that eggs from caged hens originate from Poland. The decrease in imports from Poland in recent years could also be related to the stronger demand from processors for alternative eggs.

<sup>18</sup> <https://www.bmel.de/DE/themen/ernaehrung/lebensmittel-kennzeichnung/pflichtangaben/eiervermarktung.html>

<sup>19</sup> <https://albert-schweitzer-stiftung.de/unsere-arbeit/kaefigfrei>

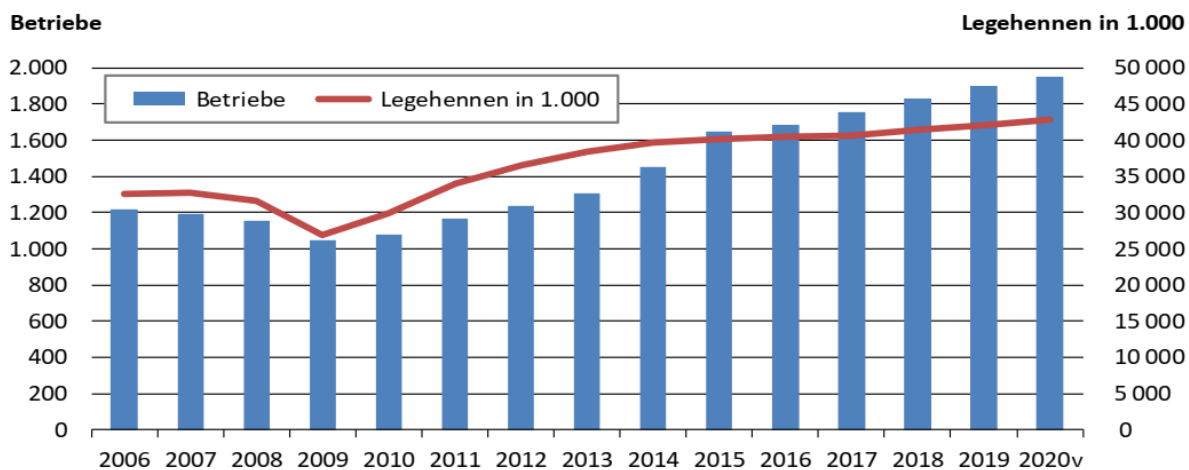


Bio = organic, Freiland = free-range, Gesamt = sum, Boden = barn

Figure 6: Share of German eggs in household purchases of eggs from different housing systems from 2013 to 2020, in % (MEG 2021)

In the following, the development of **farms and hen places** is presented. Figures are available for farms with more than 3000 hen places (since 1992). But the vast majority of hens are kept on larger farms. In 2020, less than 4% of all laying hens in Germany (60.3 millions) were kept in flocks of less than 1000 hens and 13% in flocks of less than 10 000 hens (Destatis 2021).

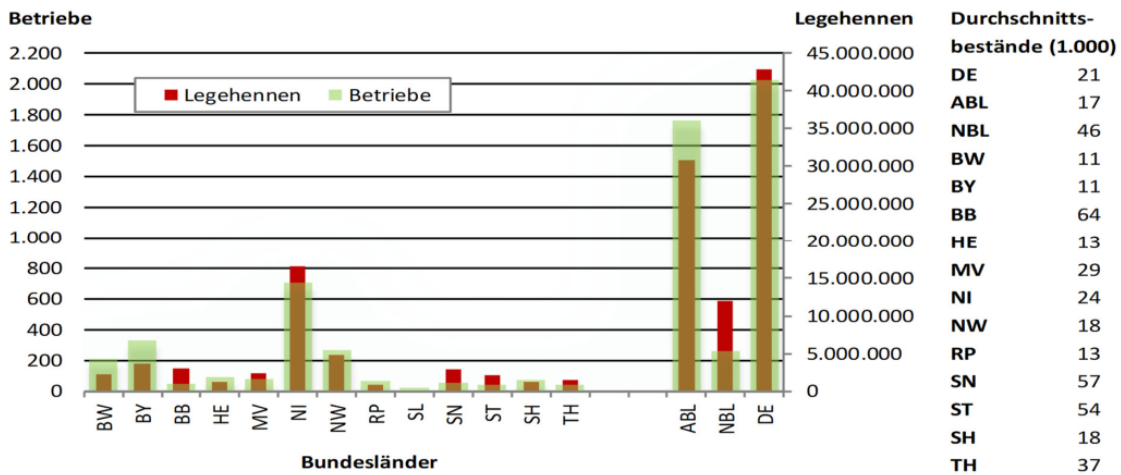
Figure 7 shows the development of farms and laying hens (in farms with more than 3000 hen places) from 2006 to 2020. As was already evident from the presentation of egg production, there was a low during the transition phase in 2009 / 2010. Since then, both the number of farms and the number of hens kept have risen continuously. Thus, the feared collapse of chicken farming after the ban on cages failed to happen.



Betriebe = farms, Legehennen = laying hens

Figure 7: Development of farms and laying hens from 2006 to 2020 (farms with more than 3000 places) (Thünen Inst. 2021)

Figure 8 shows the distribution of hens by **federal states** and the average flock sizes in 2020. The keeping of laying hens is strongly concentrated in the north-west of Germany (Lower Saxony (NI) and North Rhine-Westphalia (NW). Bavaria (BY) and Baden-Württemberg (BW) also have a relatively high number of farms and laying hens, but lowest flock sizes. On average, 21,000 hens are kept per farm in Germany. The number of hens in the new federal states (NBL, former GDR) is significantly higher with 46,000 than in the old federal states (ABL) with 17,000.



Betriebe = farms, Legehennen = laying hens, Durchschnittsbestände = average flock size

Figure 8: Number of farms, laying hens, and average flock sizes in Federal States of Germany in 2020 (farms with more than 3000 places) (Thünen Inst. 2021)

### Housing systems

Figure 9 shows the development of housing systems for laying hens in Germany from 1992 to 2020 as a **proportion of hen places**. From the early 1990s to 2008, the percentage of battery cages declined slowly but steadily (from 96.0 to 62.1%). With the impending ban on battery cages from 2010, it then fell drastically in 2009 (37.7%) to 18.2% in 2010. Since 2011 (13.9%), the proportion has been steadily decreasing slightly (from 13.9 to 5.5%).

The proportion of hens kept in barns, in particular, was the opposite (2008 21.7%, 2009 44.5%, 2010 62.8%). This opposite development in only a few years suggests that many farms with former cage systems converted to barn systems, and not stopped the production or moved abroad.

It is thus clear that cages have been replaced above all by barn keeping. The other systems, free-range and organic, have a significantly lower share, but both are continuously increasing.

The small drop in free-range systems in 2007 can be explained by the fact that organic farms, which were previously classified as free-range, were reported separately from that time onwards. Due to avian flu in 2017, a lot of free-range eggs had to be sold as barn eggs.

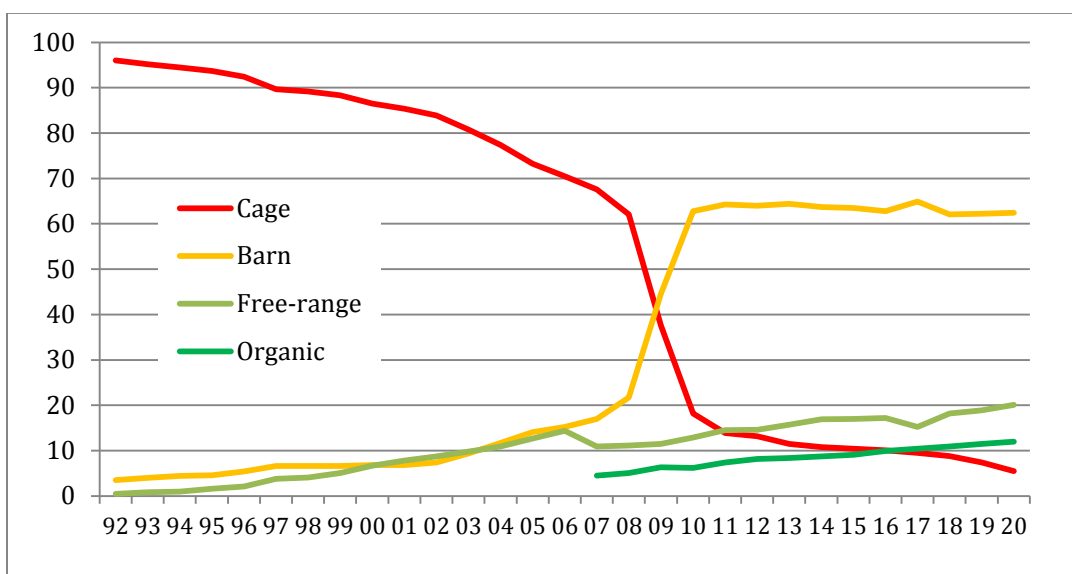


Figure 9: Development of share of hen places in different housing systems from 1992 to 2020, in % (farms with more than 3000 places) (Statistical yearbook for agriculture, various volumes)

Figure 10 also shows the development of the husbandry systems with the absolute **numbers of hen places**, as well as the total of all hen places. This shows the continuous increase in the number of hen places after the ban on conventional cages. The total number of hen places only decreased more in the two years before the ban on conventional cages. After that, however - contrary to what many had predicted - there was a continuous increase, so that today more hens are kept than before the ban. Furthermore, the figure shows the continuous increase of hen places in the various alternative forms of housing. This shows that more and more new hen houses were built (compare also the increasing number of farms).

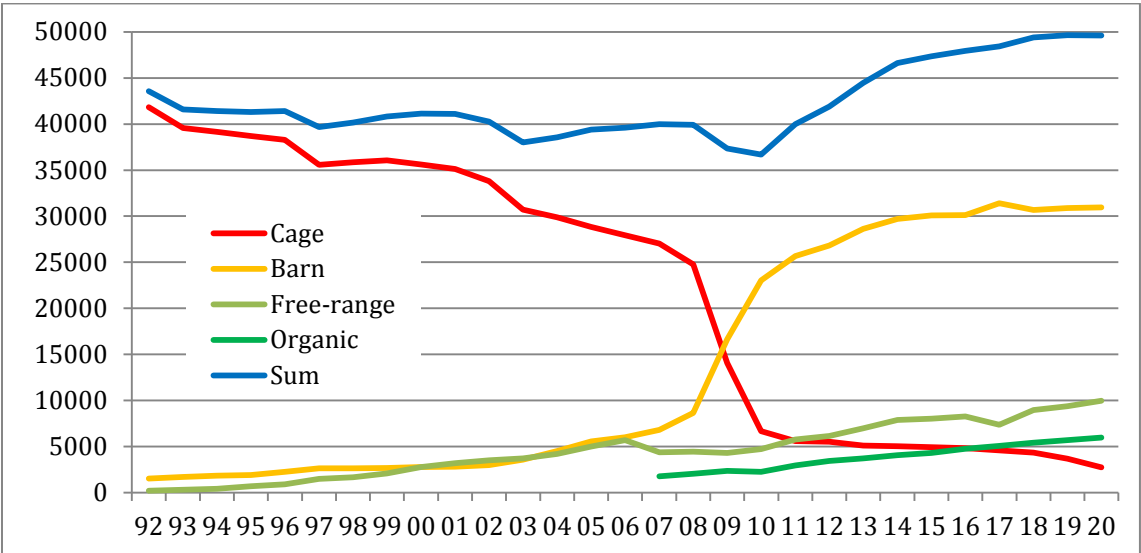


Figure 10: Development of number of hen places in different housing systems from 1992 to 2020 (farms with more than 3000 places) (Statistical yearbook for agriculture, various volumes)

Figure 11 shows the development of **farms** according to housing system from 1990 to 2020. The same trends can be seen as for the hen places. The sum of farms is lower than the sum of the different housing systems, as some farms own several housing systems. The sum shows a continuous decline until the expected cage ban in 2010 (from 1553 in 1992 to 1111 in 2010). However, after the ban, almost a doubling in ten years can be seen (up to 2025 farms in 2020).

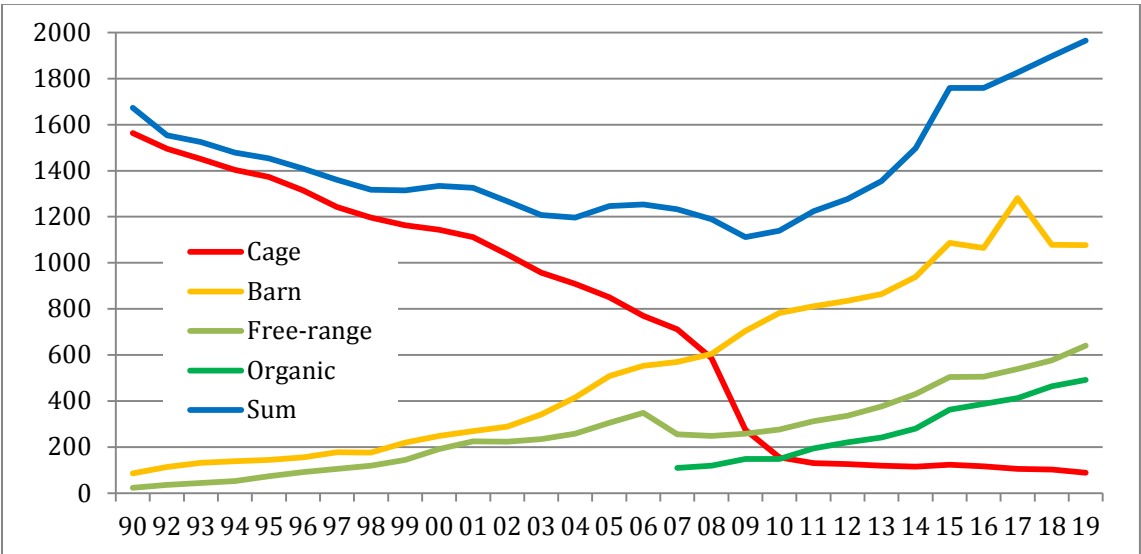


Figure 11: Development of number of farms with different housing systems from 1992 to 2020 (farms with more than 3000 places) (Statistical yearbook for agriculture, various volumes)

For **2020**, in addition to the annual evaluation of the husbandry systems on farms with more than 3000 places, there was also a special evaluation of more farms (larger than 5 hectares or more than 1000 poultry). Here, with 46,710 farms, many more were recorded than in the evaluation of farms with over 3000 places, which shows that very many farms have less than 3000 places. However, these also keep far fewer hens. If the corresponding differences are formed from the two evaluations, farms with less than 3000 places had an average of only 252 places. The distribution of the housing systems was about the same in both evaluations, although the average flocks were significantly smaller in the latter (see Table 3). As expected, farms with aviaries had more hen places (12,855) than those with deep litter (1671).

Table 3: Housing systems for laying hens in 2020 from two surveys (Destatis 2021a,b)

	All farms	Farms > 3000 places
<b>Number of farms</b>	46,710	2,025
<b>Hen places</b>	60,853,200	49,614,392
<b>Places per farm</b>	1,303	24,501
<b>Cage places (%)</b>	4.4	5.5
<b>Barn places (%)</b>	64.8*	62.4
<b>Free-range places (%)</b>	30.9	20.1
<b>Organic places (%)</b>	(9.5**)	12.0
<b>Farm places cage</b>	1,589	34,366
<b>Farm places barn</b>	3,765	28,902
<b>Farm places free-range</b>	418	14,552
<b>Farm places organic</b>	1,105	11,456

\* thereof 41.4 % aviaries / 23.4 % deep litter, \*\* included in free-range

### Conversion phase

In the following, the narrower conversion period (2008 – 2011) will be examined in more detail as this could be interesting for other countries facing a changeover. Figure 12 showing German **egg production on a monthly basis** from the beginning of 2008 to August 2011 illustrates that it declined continuously until the beginning of 2010 and then rose steadily again. This is an indication of the conversion measures that gradually took place in the farms.

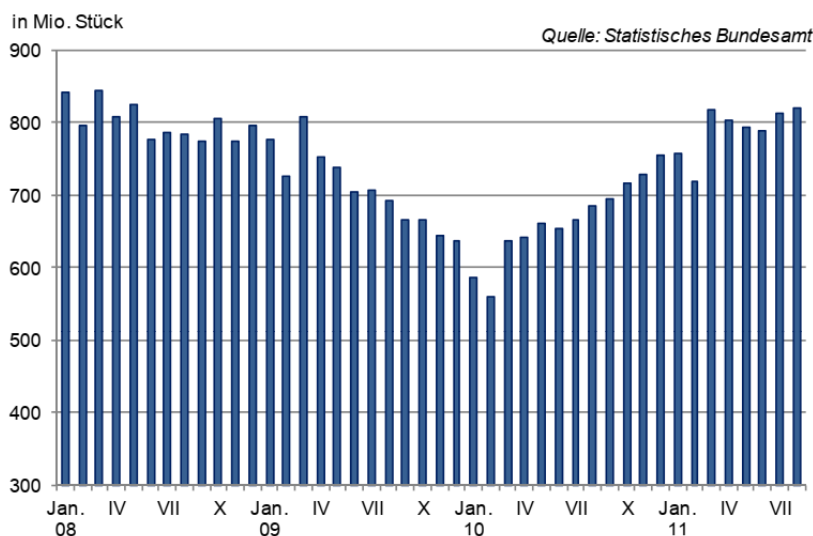
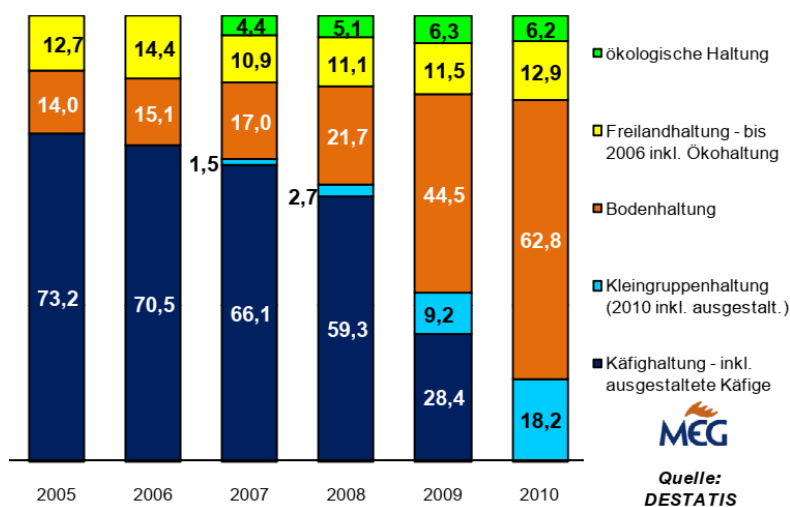


Figure 12: Egg production by month from 2008 to 2011, million eggs (MEG)

For some years during the conversion period, the MEG showed the hen places separately for the **different types of cages** (see Figure 13). In December 2009 there were still 10.023 million hen places in conventional cages (26.8%), 592,984 places in enriched cages according to the EU regulation (1.6%), and 3.453 million places (9.2%) in the German special type enriched cages (so called small group housing). The utilisation of the cages (proportion of hens to hen places) as a whole was only 53.8% shortly before the ban on battery cages (MEG Market Balance 2010). The share of hen places in small group housing increased from 1.5 % in 2007 to 2.8 % in 2008 to 9.2 % in 2009 (no separate figures from 2010). In 2011, no new capacities for small group housing were built up (MEG market balance 2012).

There were also various statements that the figures for cage places for 2010 (after the ban on conventional cages) were too high, e.g. from the large control organisation for eggs from alternative production (KAT). The poultry industry repeatedly emphasised that the high value of 18 % for small groups would indicate the importance of this housing system and that the retailers should therefore not delist these eggs.



ökologisch = organic, Freiland = free-range, Bodenhaltung = barn, Kleingruppenhaltung = small group cages, Käfighaltung = cages

Figure 13: Housing systems from 2005 to 2010, % of hen places (farms with more than 3000 places) (MEG)

Figure 14 shows the development of average **cage places per farm** from 2006 to 2013. They increased until the ban on conventional cages, which indicates that initially smaller farms abandoned cage rearing. The decrease from 2009 to 2010 might be related to the fact that some larger farms with derogation for maximum extension until end of 2009 stopped afterwards. From 2011 onwards, the flocks remained stable.

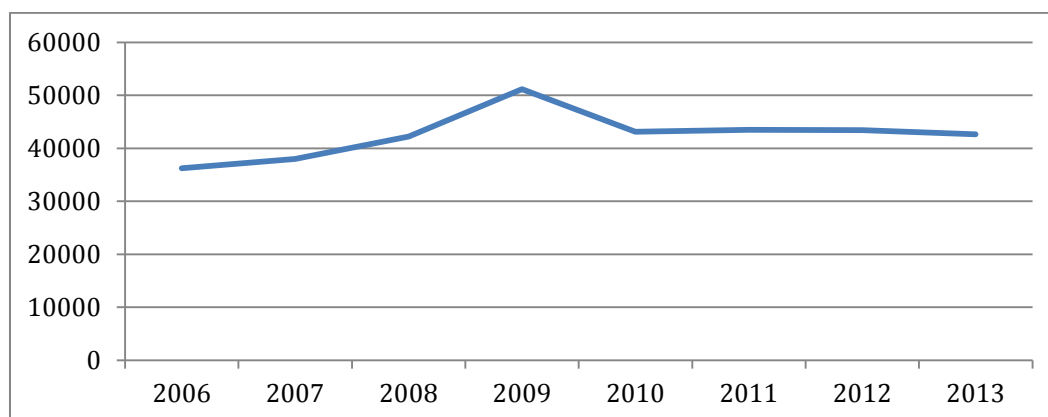


Figure 14: Average hen places in cage farms from 2006 to 2013 (farms with more than 3000 places) (data: Destatis)



However, a closer look at the distribution of flock **size classes** shows that the share in the class of the largest farms (more than 200,000 places) increased and stocks below 50,000 decreased (see Figure 15).

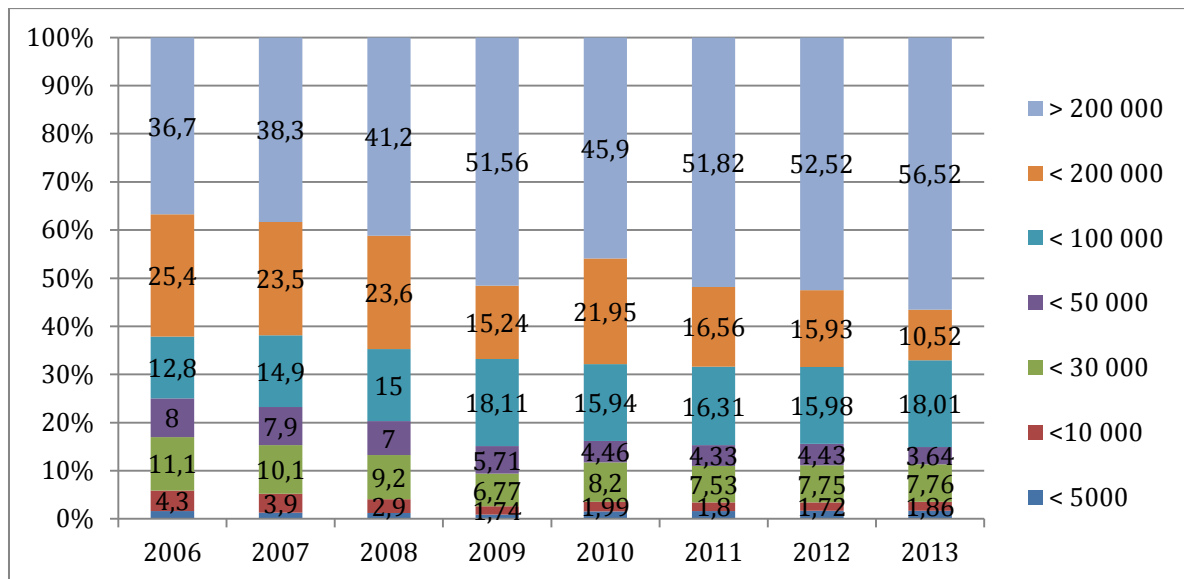
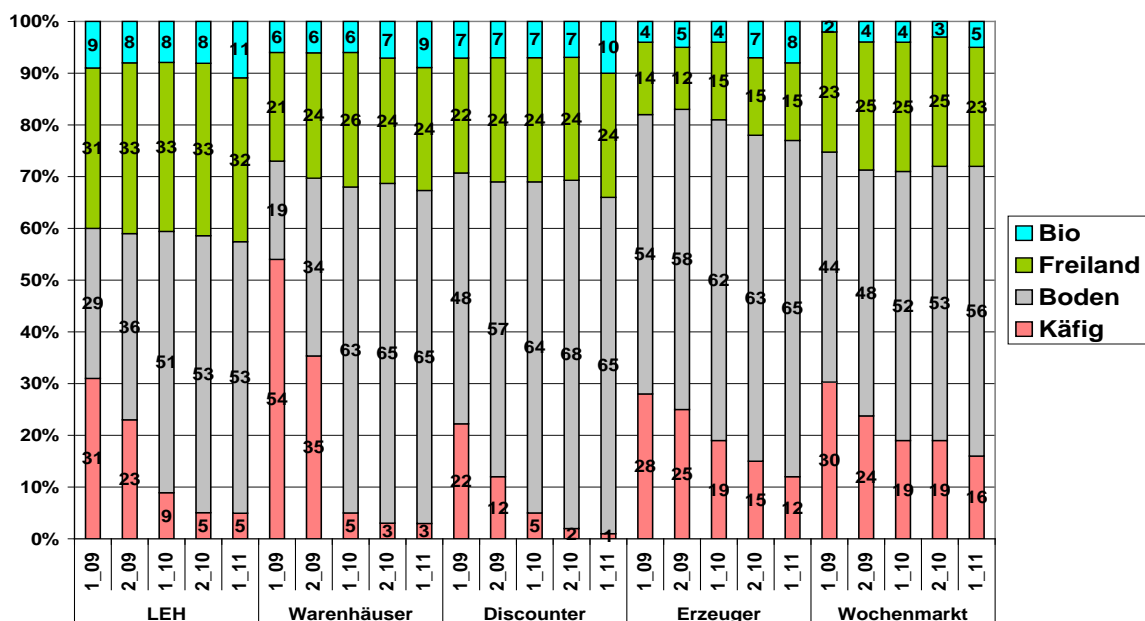


Figure 15: Percent of caged hen places in different size classes from 2006 to 2013 (farms with more than 3000 places) (Data: Destatis)

An evaluation of **egg purchases by farming method** on a half-yearly basis from 2009 to mid-2011 (see Figure 16) shows that purchases of eggs from caged hens decreased in all places of purchase, slightly less in the case of purchases from producers and weekly markets. This can be explained by the increasing delisting of eggs from caged hens in the retail sector.



Bio = organic, Freiland = free-range, Boden = barn; Käfig = cage

LEH = food retail, Warenhäuser = department stores, Erzeuger = producers, Wochenmarkt = weekly market

Figure 16: Egg purchases by type of farming method in different purchasing locations from the beginning of 2009 to the first half of 2011, half-yearly values (data from DGS intern 30/2011, source Hörning 2009)

More detailed information on the conversion of conventional cages is available from parliamentary questions in the **Lower Saxony state** parliament (Drs. 15/3883, 16/1133, 16/1331, 16/1625<sup>20</sup>). At the beginning of 2006, Lower Saxony held 33 % of Germany's 40.2 million hen places. At that time there were still 407 farms with cages in Lower Saxony. According to the Animal Welfare Ordinance, all German farms had to submit a conversion concept by 15 December 2006 if they wanted to keep their cages as an exception for another two years.

382 farms submitted such a concept. Of these, 154 (40%) stated that they would convert to small group housing (i.e. the German version of enriched cages; with 2 million hen places), 88 (23%) to barn egg production (0.8 million), and 140 (37%) to both types of housing (12 million).

At the beginning of 2007, there were still 390 cage farms with about 12 million hens.

However, when the derogation expired at the end of 2008, only 102 (27 %) of the 382 farms with a concept had converted (81 to barn egg production, 21 to small group housing).

114 farms (30 %) applied for a further derogation of one year (which was possible under certain conditions), i.e. until the end of 2009 (of which 108 were granted).

55 farms (14 %) did not apply for such a permit, i.e. they kept their animals illegally at that time. In several cases regulatory offences were initiated.

98 farms (37 %) had ceased egg production, i.e. had not complied with the requested change of use end of 2006.

At the beginning of 2009, there were still 5,018,145 hens in conventional cages on 150 farms and in Sept. 2009 2,743,728 in 75 farms, 11 farms with 26% of the hens had no derogation.

In March 2010 there were 2,744,200 hen places in the new enriched cages (small groups; 32.5 %; Destatis 2011), which was the highest share of all federal states.

Overall, the figures show that almost all farms initially applied for a possible extension of two years for battery cages. Some of the farms then stopped production despite having applied for a changeover. Others then applied for the maximum extension to three years. Others continued to keep their hens (illegally) without applying for this extension.

### *Farm sizes*

Figure 17 shows the development of **average flock sizes** for the different housing systems from 1992 to 2020 (farms with more than 3000 places). Cage farms had the largest flocks in each case, followed by farms with barn and then free-range systems. Organic farms (only recorded since 2007, before listed under free-range) had the smallest flocks.

In the 1990s and 2000s, flock sizes on cage farms increased steadily. In 2020, some large farms stopped using cages.

In recent years, there has been a trend towards smaller flocks on free-range and organic farms. This is probably related to new entrants in the market.

Furthermore, many farmers started with mobile houses for laying hens below the statistical detection threshold for housing systems (3000 hen places). According to industry information, there should already have been more than 2.5 million mobile hen places in more than 2,000 farms in Germany by mid-2020, and the upward trend is continuing (AMI 2021), compare also the overview of manufacturers from consultant Jutta van der Linde in 2019<sup>21</sup>.

In 2020, average flocks amounted to 34,363 in cage farms, 28,903 in barn farms, 14,553 in free-range farms and 11,456 in organic farms (sum 2025 farms).

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<sup>20</sup> <https://www.landtag-niedersachsen.de/parlamentsdokumente/parlamentsdokumente/>

<sup>21</sup> <https://www.oekolandbau.nrw.de/fachinfo/tierhaltung/schweine/gefluegel/mobilstaelle-am-deutschen-markt>

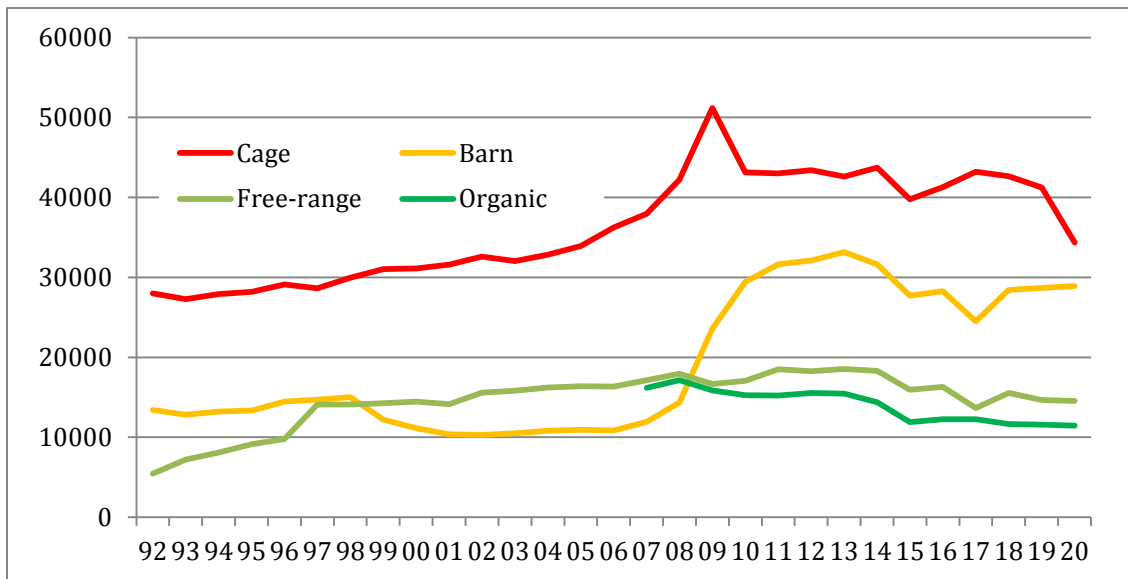


Figure 17: Average hen places according to housing system from 1992 to 2020 (farms with more than 3000 hen places) (data: Destatis)

Figure 18 shows the distribution of hen places by **size classes** of farms from 2015 to 2020, that is, after the transition phase. No major changes can be seen in this period, except for a slight decrease in farms with more than 30,000 hen places. The number of farms increased from 1650 to 1952. Most hens are kept in farms between 10,000 and 30,000 places, which can be explained by licensing regulations. Stricter environmental regulations (Bundes-Immissionsschutzgesetz) apply to thresholds of 15,000 and 40,000 laying hens respectively.

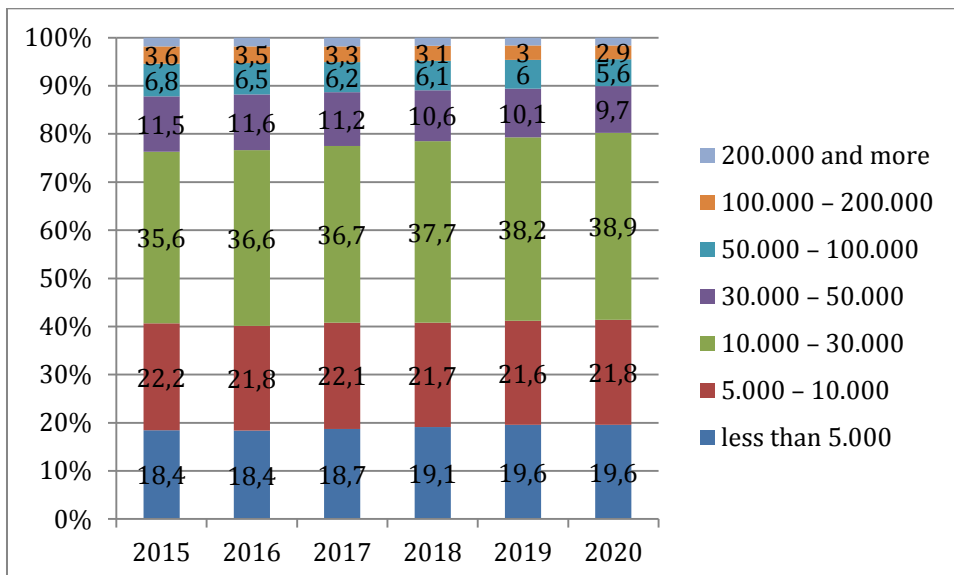


Figure 18: Distribution of hen places by size classes from 2015 to 2020 (farms with more than 3000 hen places) (data: BLE 2020)

Most of the previous evaluations referred to farms with more than 3000 places. Annual data is available for these. Less frequently, laying hen keeping is recorded on all German farms (every 3 - 4 years), with at least 5 hectares in size or at least 1000 poultry. Table 4 shows the latest available data for March 2020. As already mentioned (compare Table 3), there are many more farms, but with then significantly smaller flocks on average. 47,104 farms together kept 60,317,038 hens, i.e. an average of 1281 hens. However, 84% of the farms had fewer than 100 hens, with only 1.4% of the hens.

**Table 4: Keeping of laying hens in Germany according to size classes on March 2020, farm > 5 ha or > 1000 poultry (Destatis 2021)**

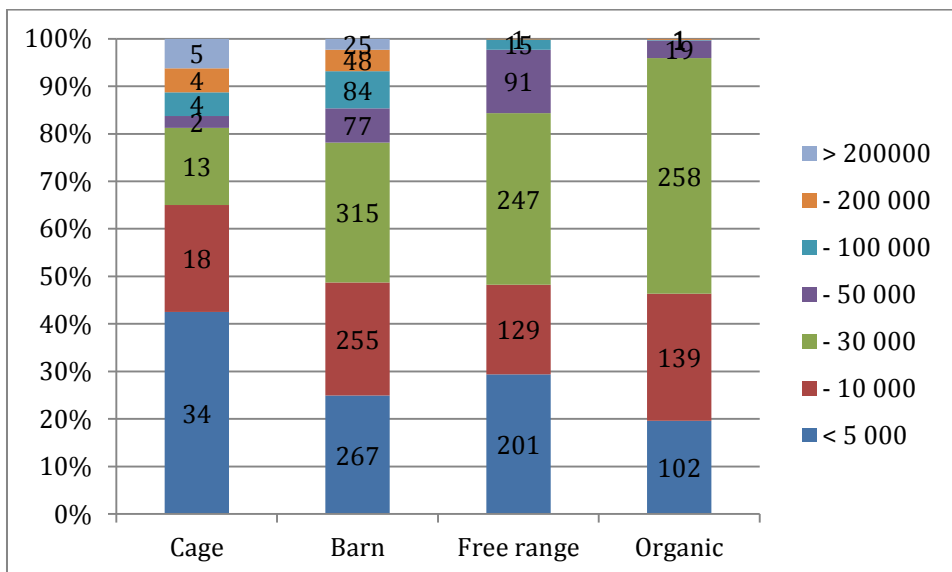
Lfd. Nr.	Betriebe mit ... bis ... Haltungsplätzen für Legehennen	Betriebe <sup>1</sup>	Haltungsplätze für Legehennen	Bestand an Legehennen		Viehbestand insgesamt	Landwirtschaftl. genutzte Fläche	
				Anzahl				GV
				1	2			
<b>Deutschland</b>								
1	1 - 99	39 729	850 870	699 439	2 798	1 258 760	1 434 233	
2	100 - 999	4 611	1 412 623	1 201 706	4 807	189 462	280 620	
3	1 000 - 9 999	1 627	5 682 891	5 080 449	20 322	72 884	114 641	
4	10 000 - 49 999	924	20 609 197	19 315 953	77 264	107 467	68 544	
5	50 000 und mehr	213	31 761 457	28 180 063	112 720	145 196	21 396	
6	Insgesamt	47 104	60 317 038	54 477 610	217 910	1 773 769	1 919 434	

Betriebe = farms, Haltungsplätze = hen places, Legehennen = laying hens, Bestand = number, Viehbestand = all livestock, Landwirtschaftl. genutzte Fläche = size of the farm

Anzahl = number, GV (Großvieheinheiten = converted to 500 kg liveweight), ha = hectare

Figure 19 shows the distribution of size classes according to **housing systems** in 2020 in farms with more than 3000 places. Of the 2025 farms, 80 had cages, 1071 barns, 684 free range and 520 were organic (multiple answers possible). Almost half of the farms with barn, free-range or organic husbandry kept less than 30,000 hens. Above this size category, the proportion of hens on larger farms increased in the order organic - free-range - barn. Furthermore, a higher proportion of cage farms with less than 5,000 hens can be seen.

The figure shows the number of farms. A similar representation of the number of hen places is not possible because data is missing for some size classes. Detailed figures can be found in Table 5.



**Figure 19: Number of farms according to size class and housing system in 2020 (farms with more than 3000 hen places) (data: Destatis 2021)**

Table 5: Hen places and egg production according to housing systems and size classes in 2020 (farms with more than 3000 places) (Data: Destatis 2021)

Hen places		Farms	Hen places	Hens	Eggs	Eggs per hen	Eggs hen and day	Capacity use
Housing	Size class	<i>n</i>	<i>n</i>	<i>n</i>	1000	<i>n</i>	<i>n</i>	%
Barn	< 5 000	267	835641	668924	188531	281,8	0,77	80,0
	- 10 000	255	1726305	1399759	392548	280,4	0,77	81,1
	- 30 000	315	5009569	4183352	1168061	279,2	0,76	83,5
	- 50 000	77	2878087	2423755	722773	298,2	0,81	84,2
	- 100 000	84	5838162	5029983	1535699	305,3	0,83	86,2
	- 200 000	48	6346205	5582286	1723916	308,8	0,84	88,0
	> 200000	25	8320557	7103414	2245017	316,0	0,86	85,4
	<b>Sum</b>	<b>1.071</b>	<b>30.954.525</b>	<b>26.391.473</b>	<b>7.976.544</b>	<b>302,2</b>	<b>0,83</b>	<b>85,3</b>
Free range	< 5 000	201	487013	409053	122452	299,4	0,82	84,0
	- 10 000	129	880646	773295	224420	290,2	0,79	87,8
	- 30 000	247	4110228	3653195	1101253	301,4	0,82	88,9
	- 50 000	91	3429729	3082461	944375	306,4	0,84	89,9
	- 100 000	15	.	.	.	286,4	0,78	83,5
	- 200 000	1	.	.	.	317,7	0,87	84,7
	> 200000	-	-	-	-	-	-	-
	<b>Sum</b>	<b>684</b>	<b>9.953.542</b>	<b>8.792.175</b>	<b>2.645.721</b>	<b>300,9</b>	<b>0,82</b>	<b>88,3</b>
Cage	< 5 000	34	100205	74533	20971	281,4	0,77	74,4
	- 10 000	18	116648	94137	26883	285,6	0,78	80,7
	- 30 000	13	231943	191000	53474	280,0	0,76	82,3
	- 50 000	2	.	.	.	280,5	0,77	89,2
	- 100 000	4	.	.	.	302,3	0,83	90,0
	- 200 000	4	579812	526944	158611	301	0,82	90,9
	> 200	5	1326744	1193694	388700	325,6	0,89	90,0
	<b>Sum</b>	<b>80</b>	<b>2.749.259</b>	<b>2.434.149</b>	<b>754.128</b>	<b>309,8</b>	<b>0,85</b>	<b>88,5</b>
Organic	< 5 000	102	317494	276540	77406	279,9	0,76	87,1
	- 10 000	139	888667	809115	229520	283,7	0,78	91,0
	- 30 000	258	3870238	3498619	1043274	298,2	0,81	90,4
	- 50 000	19	.	.	.	281,2	0,77	84,7
	- 100 000	1	.	.	.	292,0	0,80	94,9
	- 200 000	1	.	.	.	280,3	0,77	79,0
	> 200000	-	-	-	-	-	-	-
	<b>Sum</b>	<b>520</b>	<b>5.957.065</b>	<b>5.326.209</b>	<b>1.559.231</b>	<b>292,7</b>	<b>0,8</b>	<b>89,4</b>
Sum	< 5 000	411	1362255	1115018	320847	287,8	0,79	81,9
	- 10 000	437	2976146	2527562	716020	283,3	0,77	84,9
	- 30 000	785	12574266	10971224	3203811	292,0	0,80	87,3
	- 50 000	193	7216551	6271444	1880584	299,9	0,82	86,9
	- 100 000	110	7680561	6636679	2005867	302,2	0,83	86,4
	- 200 000	57	7665807	6687713	2051623	306,8	0,84	87,2
	> 200000	32	10138805	8734366	2756871	315,6	0,86	86,1
	<b>Sum</b>	<b>2.025</b>	<b>49.614.392</b>	<b>42.944.007</b>	<b>12.935.624</b>	<b>301,2</b>	<b>0,82</b>	<b>86,6</b>

(- = zero, . = confidential)

## Household purchases

In the following, the development of the purchasing behaviour of consumers will be considered. 52% of all produced eggs were marketed to private households in 2020, 49% in 2019 (Geflügeljahrbuch 2022).

Until 2001, four alternative systems could be voluntarily labelled on the packaging or on the eggs: free-range, semi-intensive, deep litter, perchery (barn). From 2002 onwards, only three types of farming were allowed (from 2004 obligatory): free range eggs, barn eggs, eggs from caged hens. In addition, eggs from organic farming could be labelled correspondingly.

Figure 20 shows the **household purchases** of eggs of different housing systems from 1994 to 2020 (cage include enriched cages, free-range includes semi-intensive, barn includes perchery). In the second half of the 1990s, alternative systems slowly increased and eggs from caged hens decreased accordingly. After the labelling of the farming method on eggs became mandatory in 2004, the share of purchases of eggs from alternative systems increased more strongly. With the delisting of eggs from caged hens by supermarket chains in 2009/10, their purchases dropped drastically to 6.6% in 2010, and since then they have continued to decline to 0.7% in 2020. In recent years, there has been a slightly stronger increase in free-range and organic eggs, with a corresponding decrease in barn eggs. In 2020, eggs from hens with an access to a free-range area (free-range, organic) already took up almost half of all household purchases (49.1%).

The type of household purchases is of course also related to supply. In the 1990s, for example, not all supermarkets offered alternative eggs.

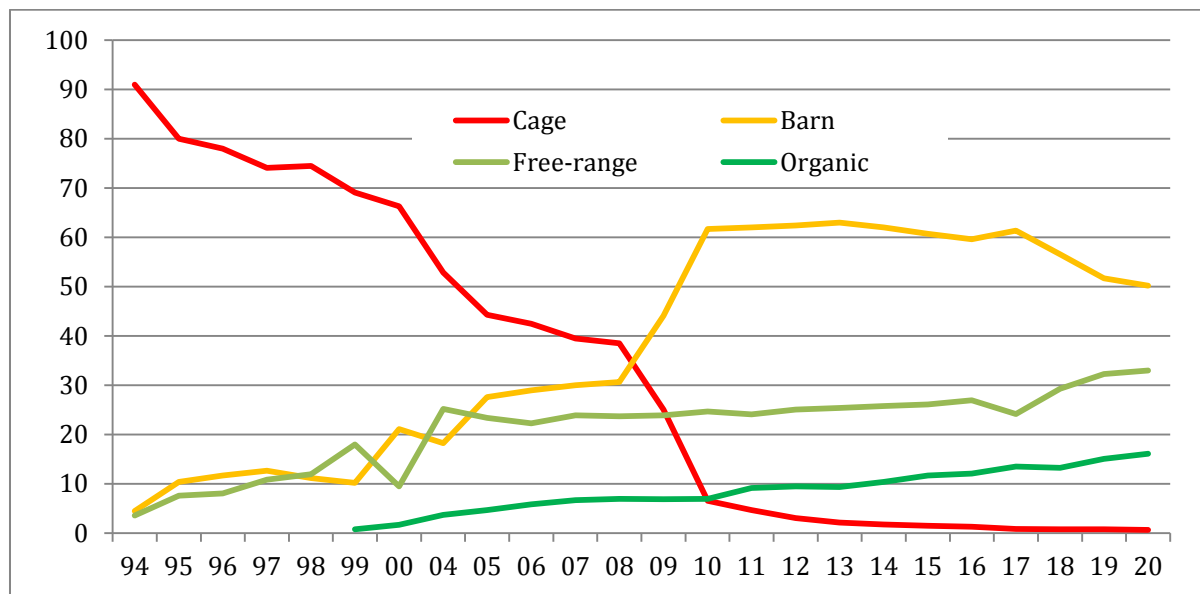


Figure 20: Household purchases of eggs from different housing systems from 1994 to 2020 (% of labelled eggs), sample size 13,000 households (Data: ZMP-/AMI-Market balance eggs and poultry, various volumes)

Figure 21 shows the development of **consumer prices** for eggs of different housing systems from 2000 to 2020. Consumer prices fluctuated much less than producer prices (also within a year, compare LEL 2021). Eggs from barn hens cost 11 - 16 cents, free-range eggs 15 - 20 cents and organic eggs 26 - 33 cents. After 2004, barn eggs were offered at a lower price, which was also due to increasing imports from the Netherlands. Initially, this also applied to free-range eggs. The cheaper prices certainly contributed to the increased demand. Free-range eggs and organic eggs showed a price increase in the last ten years. Nevertheless, the share of these eggs in household purchases increased steadily at the expense of barn eggs (see below).

Eggs from caged hens were only recorded until 2010. The price increase until then can be explained by the increasing delisting of discounters. In the remaining shopping opportunities at the producer's or at the weekly market, the prices were always higher than at the discounter.

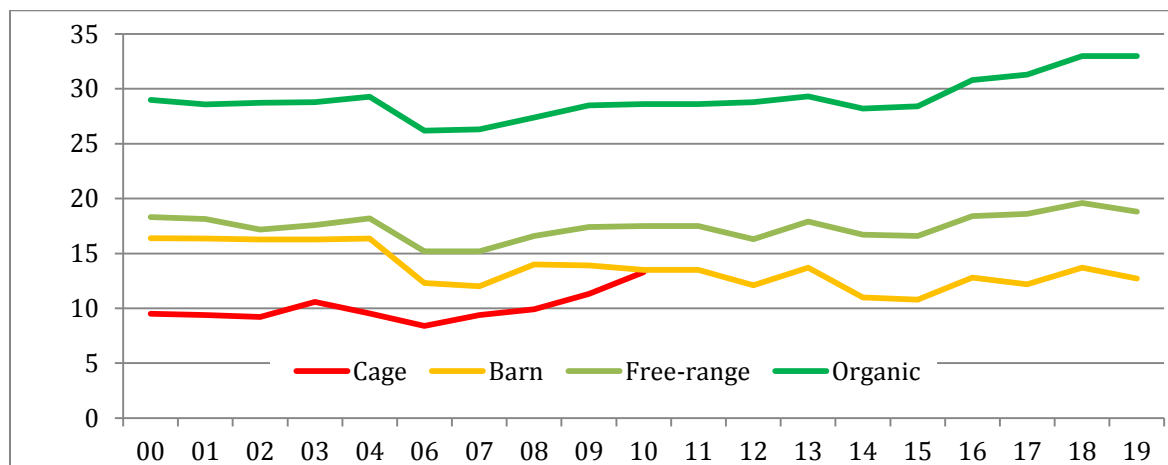


Figure 21: Consumer prices for eggs of different housing systems in Germany from 2006 to 2020 (Cent per egg, size M), annual means (data: ZMP-/AMI-Market balance eggs and poultry, various volumes)

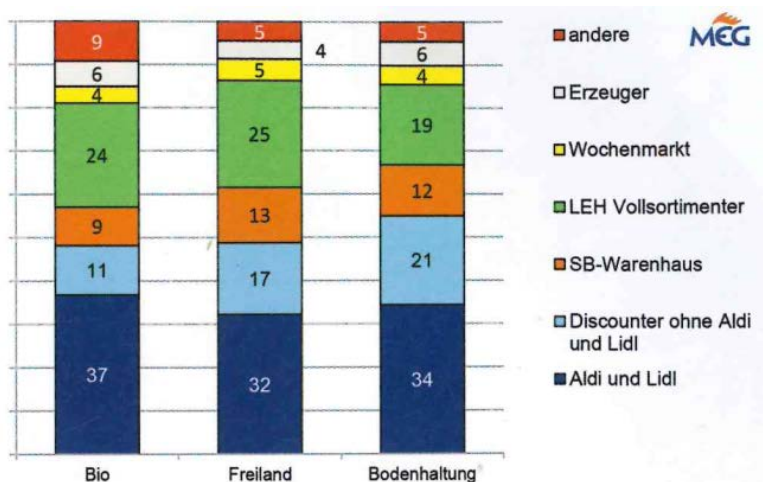
Table 6: Egg purchases by place of purchase from 2014 to 2020 (BMEL 2021)

	2014	2015	2016	2017	2018	2019	2020
<b>Einkaufsmenge in Mio. St.</b>							
Gesamt	8.403,7	8.411,4	8.367,7	8.338,9	8.277,3	8.088,7	8.982,2
Discounter	3.947,6	3.938,5	4.029,7	3.940,8	3.906,1	3.604,5	3.832,8
SB-Warenhäuser	956,5	957,7	942,6	911,3	913,2	913,1	1.033,2
Sonstige Food-Vollsortimenter	1.612,5	1.668,4	1.662,9	1.737,3	1.773,1	1.900,8	2.209,0
Wochenmärkte	501,2	461,0	415,6	401,4	407,5	409,6	440,5
Erzeuger	811,1	829,1	789,2	834,3	794,5	782,7	928,2
Sonstige Einkaufsstätten	574,7	556,8	527,8	513,8	483,0	478,2	538,5
<b>Wert in Mio. EUR</b>							
Gesamt	1.364,7	1.381,5	1.497,4	1.495,3	1.624,3	1.583,4	1.825,4
Discounter	499,0	503,6	594,6	565,3	631,9	563,9	628,1
SB-Warenhäuser	137,1	138,0	153,2	146,6	166,6	159,5	187,0
Sonstige Food-Vollsortimenter	308,4	322,2	348,3	368,1	404,7	434,9	516,5
Wochenmärkte	114,1	106,1	98,4	97,8	104,2	105,1	113,7
Erzeuger	172,9	181,6	175,8	188,5	191,4	194,5	238,7
Sonstige Einkaufsstätten	133,2	130,1	127,0	129,0	125,5	125,5	141,4
<b>Durchschnittsausgaben in EUR/10 St.</b>							
Gesamt	1,62	1,64	1,79	1,79	1,96	1,96	2,03
Discounter	1,26	1,28	1,48	1,43	1,62	1,56	1,64
SB-Warenhäuser	1,43	1,44	1,63	1,61	1,82	1,75	1,81
Sonstige Food-Vollsortimenter	1,91	1,93	2,09	2,12	2,28	2,29	2,34
Wochenmärkte	2,28	2,30	2,37	2,44	2,56	2,57	2,58
Erzeuger	2,13	2,19	2,23	2,26	2,41	2,48	2,57
Sonstige Einkaufsstätten	2,32	2,34	2,41	2,51	2,60	2,62	2,63

Einkaufsmenge = purchased quantity of eggs (Million eggs), Wert = total value of eggs purchased (Million Euro), Durchschnittsausgaben = average expenditure per egg (€ per 10 eggs)  
 SB-Warenhäuser = department stores (> 5000 m<sup>2</sup> retail space), Sonstige Vollsortimenter = full-range food stores (< 5000 m<sup>2</sup>) (e. g. Edeka, Rewe), Wochenmärkte = weekly market, Erzeuger = producers, Sonstige = others

Table 6 shows the development of egg purchases by **place of purchase** from 2014 to 2020. In 2020, almost 9 billion shell eggs were purchased by German consumers. Discounters (e.g. Aldi, Lidl) had the highest market share (e.g. 43% in 2020), followed by other super markets (so called full-range food stores, e. g. Edeka, Rewe) with 25% and department stores with 11%. However, 15% of eggs were bought directly from the producer (or at via weekly markets). Especially on this marketing channel, eggs from caged hens can still be found. For example, producers in Germany traditionally sell eggs at the door in large cities. Eggs are cheapest at discounters, full-range retailers are in the middle, and prices at producers are highest (see table).

Figure 22 shows an example of the places of purchase separately for the different **housing systems** in 2016. There were no major differences between eggs from different types of farming in the various distribution channels. Almost half of the organic eggs were also bought from discounters.



Bio = organic, Freiland = free-range, Bodenhaltung = barn;  
andere = others, Erzeuger = producers, Wochenmarkt = weekly market, LEH Vollsortimenter = full-range food shops (other super markets), Discounter ohne = Discounter without

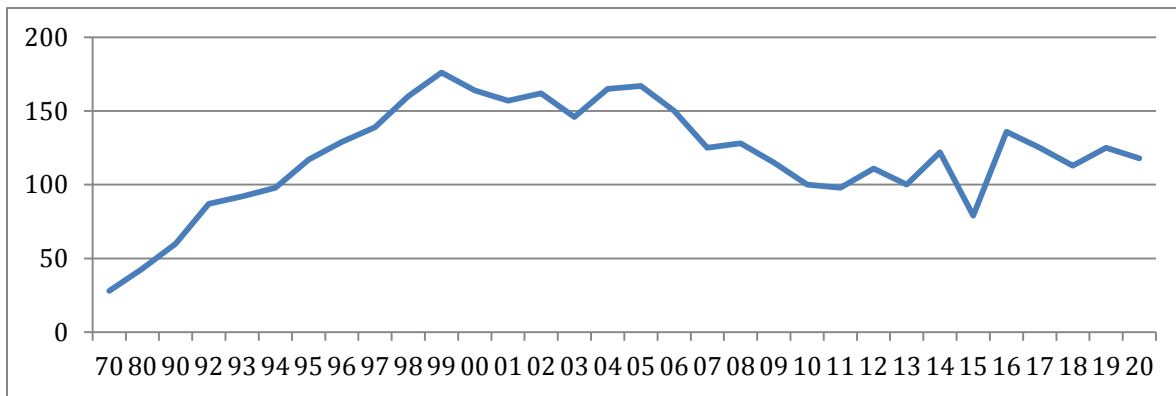
Figure 22: Places of purchase for different types of eggs in 2016 (MEG)

Average prices across all **purchasing locations** are shown in the Figure 21. Normally, eggs cost less in discounters (e.g. Aldi, Lidl) than in full-range stores like Edeka or Rewe. In 2020, an egg cost an average of 16.4 cents at discounters, 23.4 cents at full-range stores, 25.8 cents at the weekly market and 25.7 cents at agricultural producers (see Table 5).

In the Statistical Yearbook for Agriculture, so called **purchasing power** is determined on the basis of the amount of product that an average industrial worker can purchase with his hourly wage. Thus, the value is composed of the (long-term increasing) hourly wages and the (short-term fluctuating) egg prices.

Figure 23 shows the purchasing power for eggs from 1970 to 2019. Purchasing power rose sharply in the 1970s and 1980s. In the 1990s, the amount of eggs affordable in this way rose steadily, but fell again steadily in the 2000s. In the 2010s, there were larger fluctuations, but tending slightly upwards. The bend in 2015 can be explained by the change in the reference value from eggs from caged hens to floor eggs.





until 2014, eggs from caged hens, since 2015 barn eggs

Figure 23: Purchasing power for eggs from 1970 to 2020, eggs available per hourly wage (Statistical Yearbook for Agriculture, various volumes)

### Economic aspects

Figure 24 shows the **output value of agriculture** for eggs from 1996 to 2020 (the total quantity of products produced is multiplied by the average producer prices). This indicator is influenced by both the quantity of eggs produced and (fluctuating) egg prices. A particular influence is exerted by the prices of the most sold eggs, formerly eggs from caged hens, then barn eggs. After lows in 2005/06 (because of lower producer prices and slight decline in production), a more or less continuous increase can be observed. This is obviously not only due to the higher egg production shown above, but also to the higher prices for the increasing share of alternatively produced eggs. The 2020 figure is 2.5 times higher than the 2005 low.

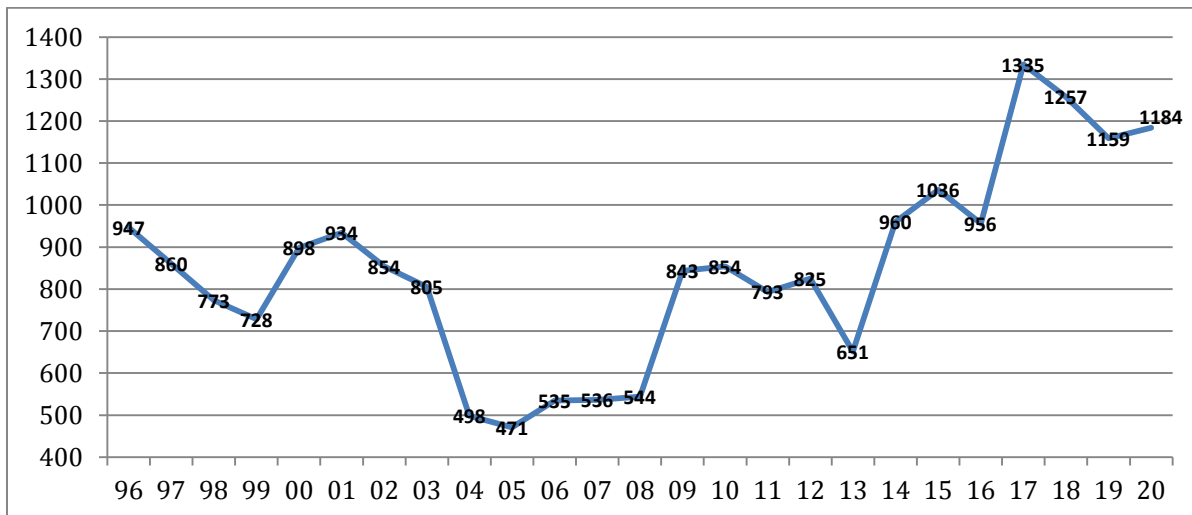


Figure 24: Output value of eggs from 1996 to 2020, millions of euros (Statistical Yearbook for Agriculture, various volumes)

Figure 25 shows the development of **laying performance** (egg yield per hen) in Germany. In 2010, there was a small slump after the conversion of the husbandry systems. Since then it has continued to rise.

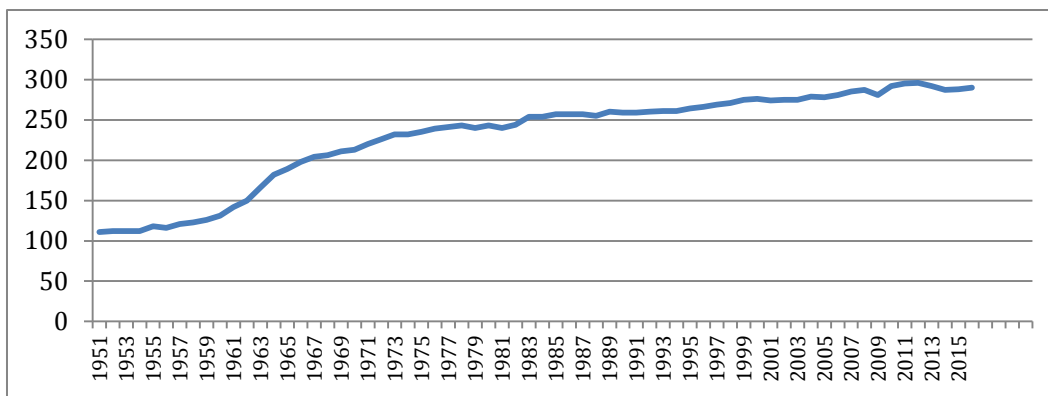


Figure 25: Egg performance from 1951 to 2020, eggs per hen and year (Federal Statistical Office)

Laying performance is influenced by **flock size**. Bigger farms had higher performances (see Table 7), which can be explained by better management.

Table 7: Egg performance according to flock size, March 2021 (BLE 2021)

Größenklassen der Hennenhaltungsplätze	Betriebe		Haltungsplätze		Legehennen		erzeugte Eier insges.		Legeleistung
	absolut	Anteil an gesamt	absolut	Anteil an gesamt	absolut	Anteil an gesamt	absolut	Anteil an gesamt	
unter 5.000	382	20 %	1.317.056	3 %	1.073.089	3 %	310.479	2 %	289
5.000 – 10.000	426	22 %	2.972.693	6 %	2.501.883	6 %	710.471	5 %	284
10.000 – 30.000	759	39 %	12.608.579	25 %	10.949.113	26 %	3.197.081	25 %	292
30.000 – 50.000	189	10 %	7.320.502	15 %	6.330.972	15 %	1.900.217	15 %	300
50.000 – 100.000	109	6 %	7.715.478	16 %	6.673.659	16 %	2.015.346	16 %	302
100.000 – 200.000	57	3 %	7.623.988	15 %	6.642.038	15 %	2.038.303	16 %	307
200.000 und mehr	31	2 %	10.157.305	20 %	8.735.093	20 %	2.756.870	21 %	316

Größenklassen = size classes (hen places), Betriebe = farms, Haltungsplätze = hen places, Legehennen = laying hens, erzeugte Eier = eggs produced, absolut = numbers, Anteil = percentage, **Legeleistung** = egg yield (eggs per hen and year)

Furthermore, egg performance could be influenced by **housing system** (see Figure 26). On average from 2015 to 2020, hens from caged hens achieved 300.7 eggs, from barn hens 299.1 eggs, from free-range hens 297.0 eggs and from organic hens 288.2 eggs. Thus, there was little difference between the types of husbandry. The slightly lower value of the organic hens can be explained by differences in feeding (e.g. no synthetic amino acids allowed).

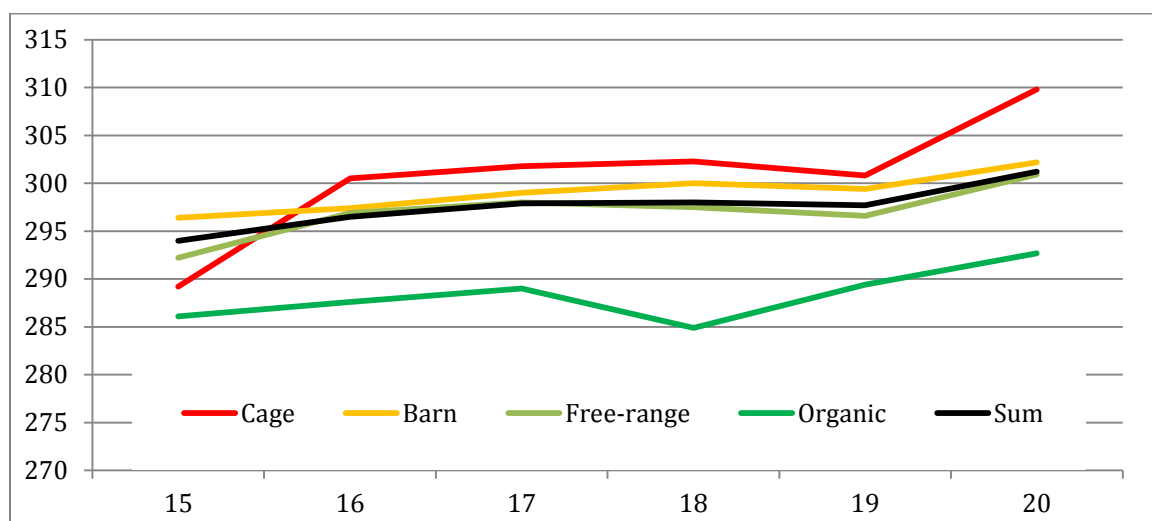


Figure 26: Laying performance according to housing system from 2015 to 2020, eggs per hen and year (farms with more than 3000 places) (data: Statistical Yearbook for Agriculture, various volumes)

Table 8 shows the development of **whole sale purchase prices** for eggs in Germany from different egg quotations (except free-range eggs: wholesale selling prices to retailers). These prices roughly reflect producer prices. The market-related fluctuations between individual years affected eggs from all housing systems equally. However, organic eggs were hardly affected by fluctuations and continuously achieved higher prices.

If only the last four years are considered for which data were available for all egg quotations, whole-sale purchase prices for Dutch eggs from caged hens or barns were lower than those from domestic production. Within Germany, eggs from caged hens achieved lower revenues than barn eggs (minus 1.47 cents, Weser-Ems region). Organic eggs achieved the highest prices (19 cents more than floor eggs). Wholesalers sold free-range eggs to retailers at higher prices than floor eggs (by 3.56 cents, South-West region).

On average from 2017 to 2020, Dutch eggs from caged hens paid 6.14 cents per egg and German eggs from caged hens from the Weser Ems region paid 6.58 cents. Dutch floor eggs averaged 6.43 cents and floor eggs from Weser Ems 8.05 cents. Organic eggs cost an average of 27.04 cents. In the South-West region, wholesalers sold barn eggs to retailers for 19.23 cents and free-range eggs for 22.79 cents.

**Table 8: Whole sale purchase prices for eggs from different housing systems in Germany from 2004 to 2020, Cent per egg, size M, annual means (data: AMI-Market balance eggs and poultry, various volumes)**

Year	Cage (NL)	Cage (D 1)	Cage (D 2)	Barn (NL)	Barn (D 1)	Barn (D 2)	Barn (D 3)	Free range (D)	Organic (D)
04		4,69	4,11						
05	4,31	4,71							
06	4,74	5,28							
07	5,68	6,22	5,77						
08	5,78	6,08	5,78						
09	6,22	6,82	6,64			8,99			
10	4,92	5,67		7,57		7,74			
11	4,93	5,45	5,28	5,45	5,88	6,22			23,56
12	7,42	8,34	8,13	8,08	8,87	9,27			24,75
13	5,13	5,86	5,75	6,12	6,66	6,95			24,83
14	5,11	5,93	6,07	6,00	6,73	6,82			24,91
15	5,77	6,04	6,41	6,83	7,22	7,18			25,80
16	4,86	5,15	5,3	6,21	6,41	6,43			26,38
17	6,81	7,12	7,34	8,10	9,31	9,21	16,25	19,70	26,49
18	6,63	6,28	6,33	7,44	8,24	8,17	19,45	22,93	26,82
19	5,69	6,51	6,68	6,38	7,50	7,25	19,96	23,46	27,24
20	5,43	5,82	5,98	6,17	7,15	6,92	21,27	25,05	27,62

Cage (NL) and Barn (NL): Wholesale cost price, Cage 1 (D): Wholesale cost price, Cage 2 (D) Region Weser-Ems, packing centre, white eggs, Barn 1 (D): Region Weser-Ems, packing centre, brown eggs, Barn 2 (D): via station, Barn 3 (D) / Free range (D): *Exception*: wholesale selling prices to the retail trade, region South-West, Organic (D): packing centre

Figure 27 shows the development of the **sales prices of the egg packing centres** for barn eggs from 2014 to 2021 (roughly corresponding to the producer prices). This also shows the fluctuations within a year. The unusual price increase in 2017/2018 can be explained by the Fipronil (insecticide) crisis, especially in the Netherlands.

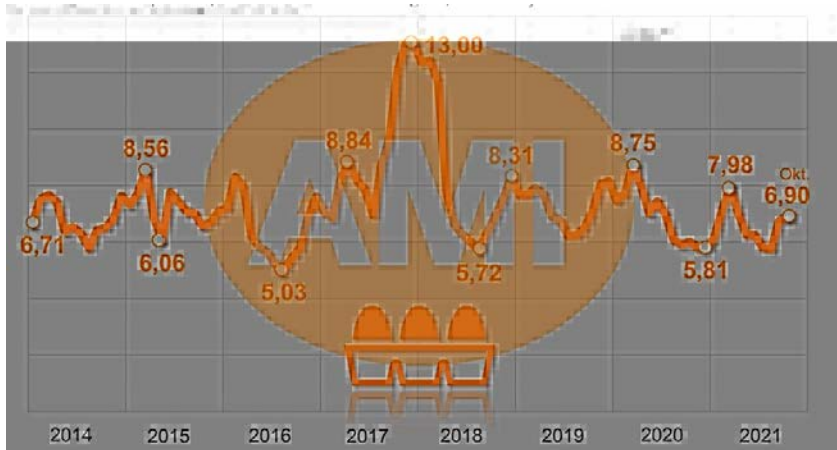


Figure 27: Packing centre egg sales prices from 2014 to 2021, barn eggs, size M (DBV)

### Switzerland

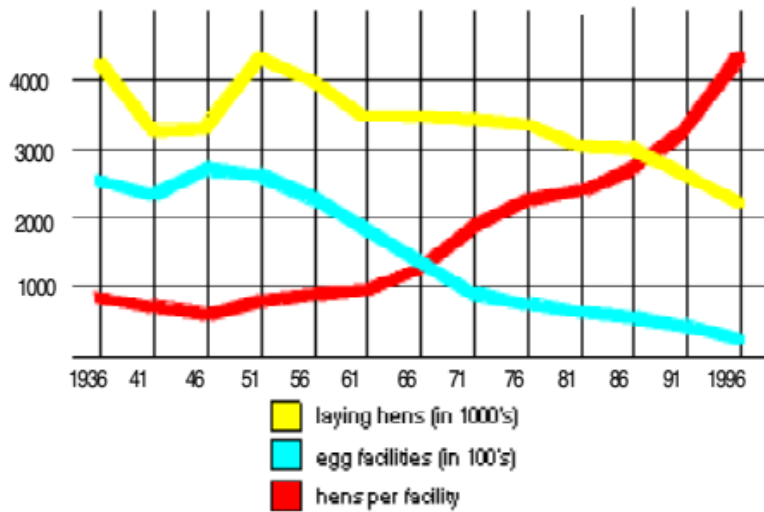


Figure 28: Concentration of hen keeping in Switzerland from 1936 to 1996 (Studer 2001)

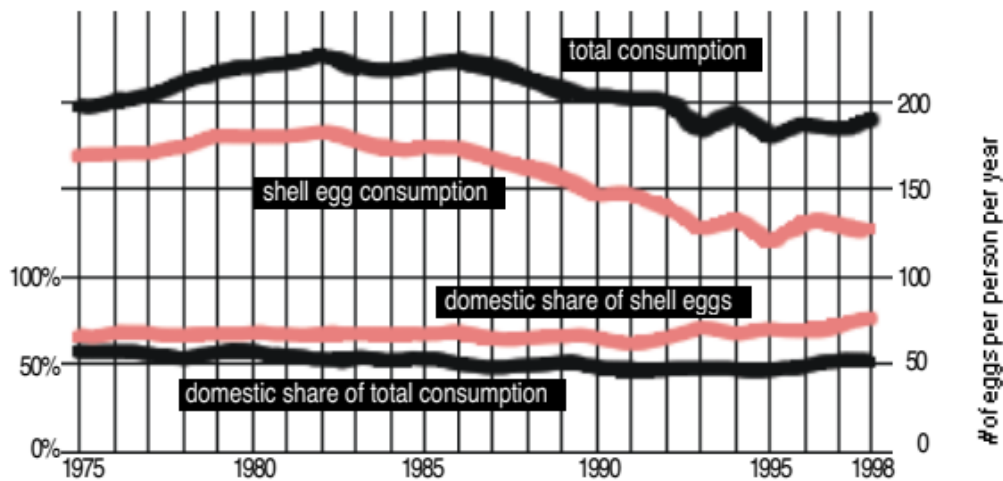


Figure 29: Egg consumption in Switzerland from 1975 to 1998 (Studer 2001)

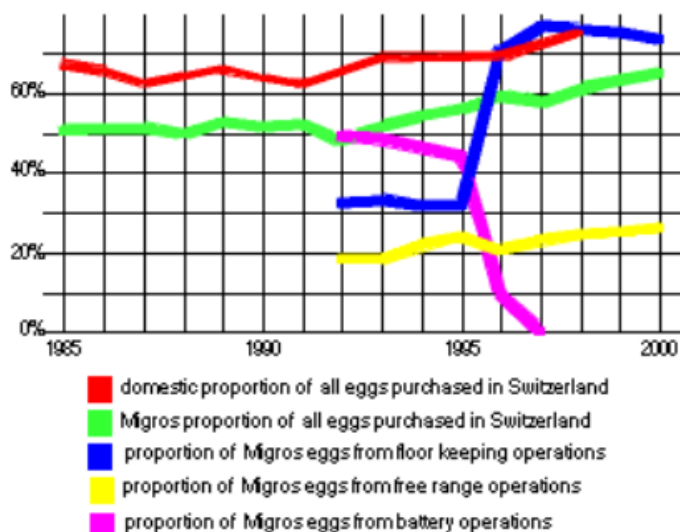
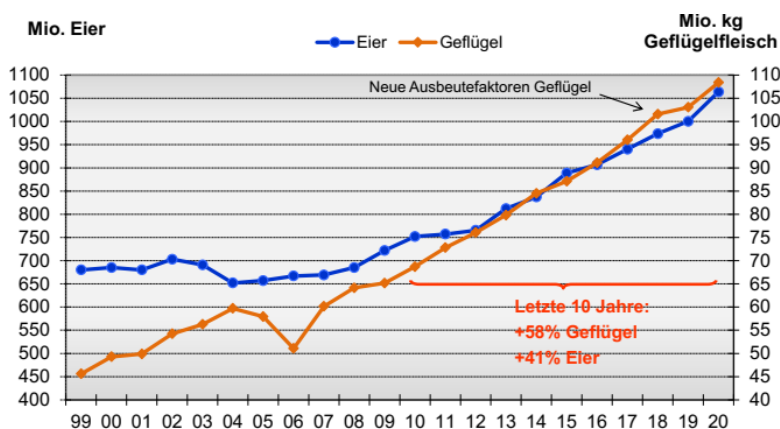


Figure 30: Distribution of eggs sold by Swiss retailer Migros from 1985 to 2000 (Studer 2001)



Veränderung 2019/2020: Eier: + 6,3% Geflügel: + 5,2%

Figure 31: Production of eggs (Eier) and poultry meat (Geflügel) in Switzerland from 1999 to 2020<sup>22</sup>

Table 9: Supply balance for eggs in Switzerland in 2019 and 2020 (Aviforum: Eier- und Geflügelmarkt 2020, SGZ 4/2021)

Eier	2019	2020	2019/20
CH-Eierproduktion (Mio. Stk.)	1000.4	1063.7	+ 6.3%
– davon CH-Bioeier-Produktion	177.6	197.3	+ 11.1%
Import-Konsumeier (Mio. Stk.)	252.1	302.8	+ 20.1%
Import-Verarbeitungseier (Mio. Stk.)	158.6	136.2	– 14.1%
Import Eiprodukte (Mio. Stk.)	176.4	157.7	– 10.6%
Inlandanteil Schaleneierkonsum (%)	78.4	76.4	– 2.0
Inlandanteil Gesamt-Eierkonsum (%)	63.0	64.1	+ 1.0
Pro-Kopf-Konsum total Eier (Stk.)	183.7	188.9	+ 5.2
Pro-Kopf-Konsum CH-Eier (Stk.)	115.8	121.0	+ 5.2

<sup>22</sup> [https://www.aviforum.ch/Portaldata/1/Resources/bildung/referate\\_tagungen/1\\_Gloor\\_Statistiken.pdf](https://www.aviforum.ch/Portaldata/1/Resources/bildung/referate_tagungen/1_Gloor_Statistiken.pdf)

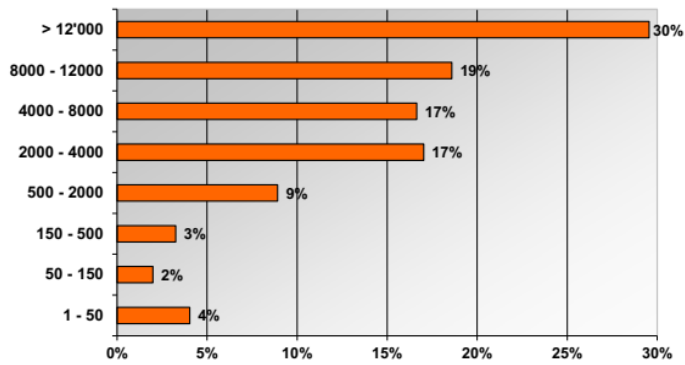
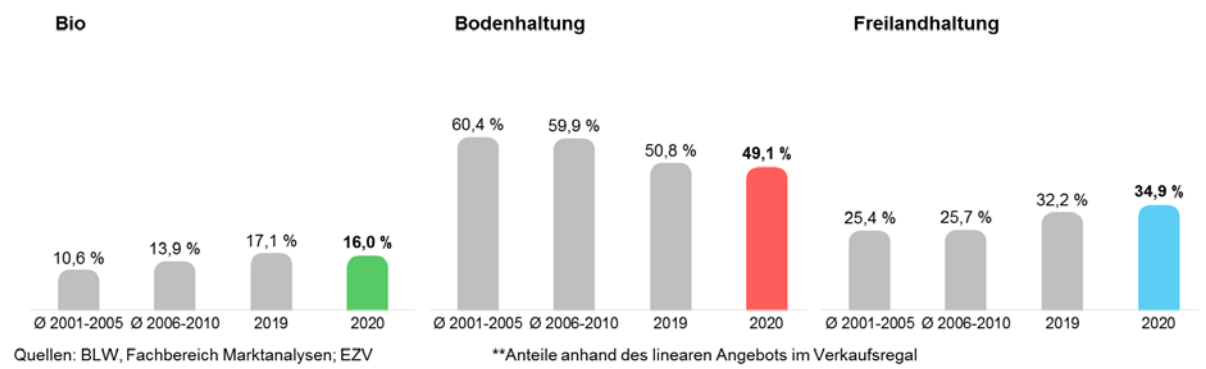


Figure 32: Distribution of Swiss hens in size classes in 2018, approx. 3.2 mill. hens (Aviforum 2020: Eier- und Geflügelmarkt 2019)



Bio = Organic , Bodenhaltung = barn, Freilandhaltung = free range

Figure 33: Distribution of Swiss eggs in the retail trade in the last twenty years (BLW)

## Austria

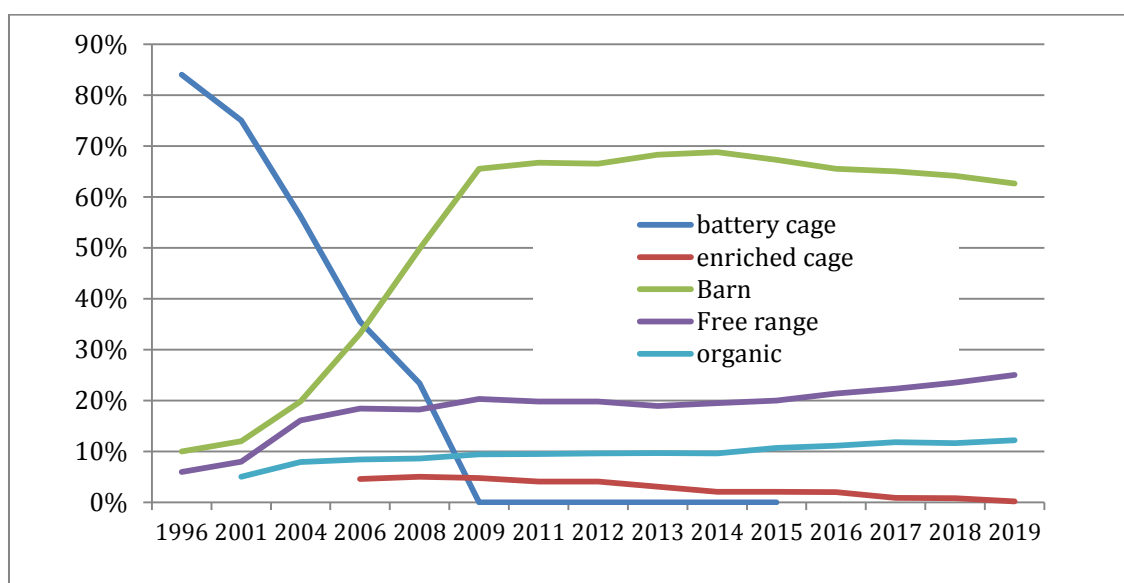


Figure 34: Percentage of Austrian hens in different housing systems from 1996 to 2019

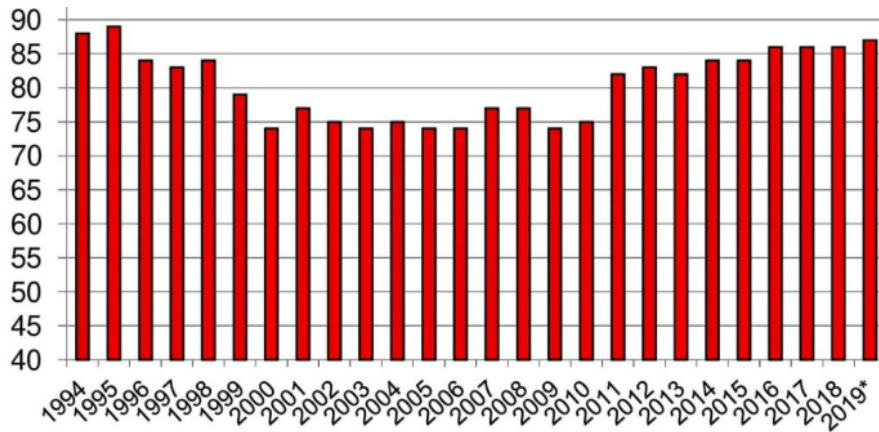


Figure 35: Development of the self-sufficiency rate for Austrian eggs from 1994 to 2019, in % (Gessl et al. 2020)

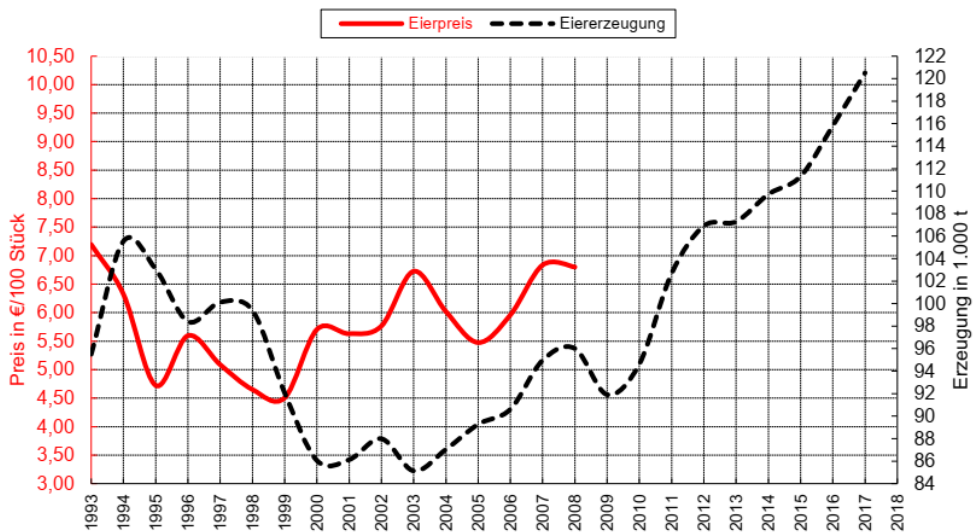
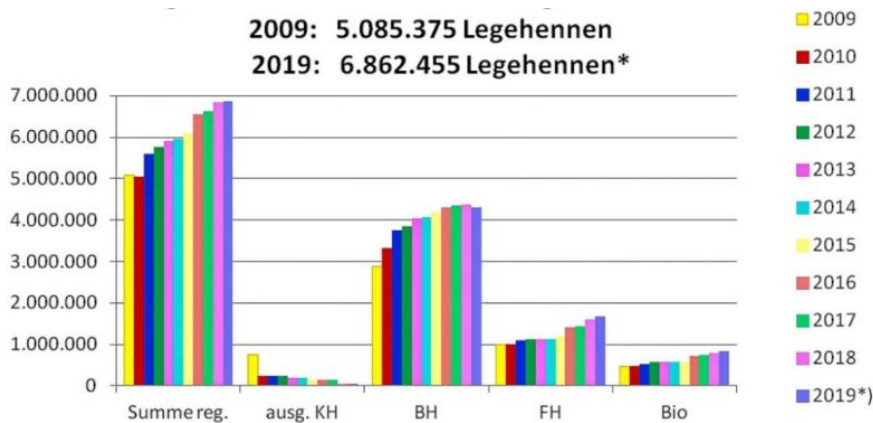
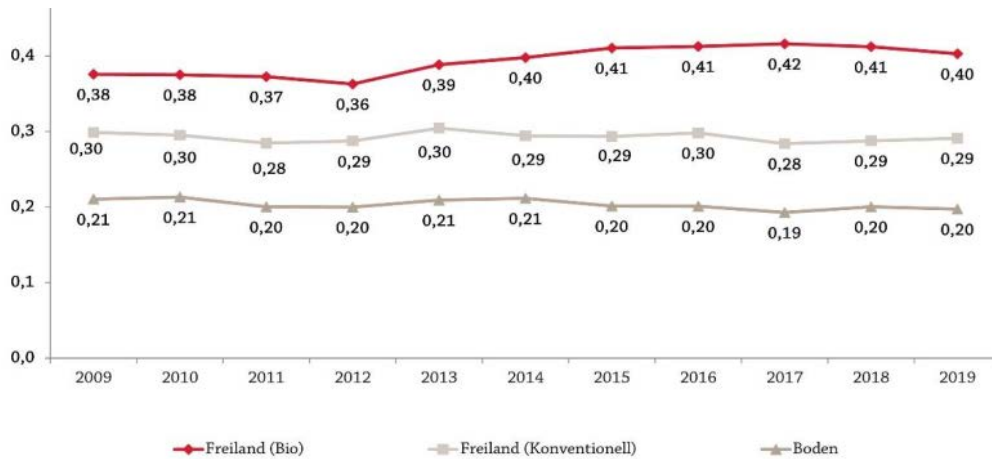


Figure 36: Egg production (black line) and prices for battery eggs (red line) in Austria from 1993 to 2018 (Gessl et al. 2020)



Summe = sum, ausg. KH = enriched cages, BH = barn, FH = free range, Bio = Organic

Figure 37: Number of Austrian hens in different housing systems from 2009 until 2019 (Gessl et al. 2020)

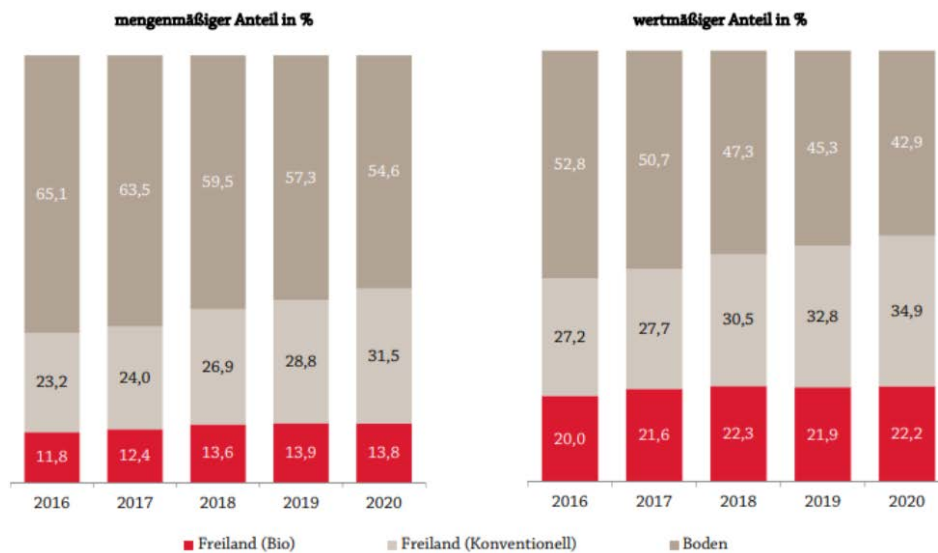


Freiland (bio) = organic, Freiland (konventionell) = free range, Boden = barn

Figure 38: Consumer prices for Austrian eggs from different housing systems from 2009 to 2019, Euro per egg (Gessl et al. 2020)

The Freiland (bio) = organic, Freiland (konventionell) = free range, Boden = barn

Figure 39 shows the increase in free-range eggs in food retail, as well as organic eggs, with a corresponding decrease in barn eggs, in principle a similar development as in Germany. Due to the higher prices of organic and free-range eggs, the percentage shift in monetary value is even higher.



Freiland (bio) = organic, Freiland (konventionell) = free range, Boden = barn

Figure 39: Market shares of the types of farming in the food retail trade from 2016 to 2020, left side percent of eggs, right side monetary value<sup>23</sup>

## Animal welfare studies

In the description of the chronological presentation, reference has already been made to selected research projects, e.g. comparison of housing systems in the "Celle Bible" at the end of the 1970s (battery cages, floor housing, free-range), studies on alternative housing systems in the 1990s, projects on small group housing in the 2000s. The sources can be found in the bibliography (though mostly in German). Below is a short list of larger projects of the last twenty years:

<sup>23</sup> <https://oe.lko.at/ostereier-versorgung-auch-2021-gesichert+2400+3378867>



- 2000-2003: Implementation of pilot projects on enriched cages on the initiative of the poultry industry, installation of cages by 4 manufacturers on 6 farms; scientific monitoring by the Federal Institute for Agriculture and the University of Veterinary Medicine Hanover (final report: Anonymous 2004).
- 2003: EpiLeg study: questionnaire surveys on 175 farms with different housing systems by the University of Veterinary Medicine Hannover (Kreienbrock et al. 2013, 2014)
- 2008-2012: Two research projects as joint projects of several institutes: Further development of small group housing for laying hens on experimental stations, as well as development of management recommendations for small group housing for laying hens under practical conditions in comparison to aviary housing (final report: BLE 2013)
- Nov. 2012 questionnaire surveys in Bavaria on 147 farms with different housing systems (72 % aviary, 26 % free range, 2 % enriched cages) (Louton et al. 2017)
- Research and recommendations within the framework of the Lower Saxony Animal Welfare Plan<sup>24</sup>

In the context of such research projects, quite a few veterinary dissertations on enriched cages were written, especially within the faculties in Hannover and Munich (see list at the end of the bibliography). It was interesting that those dissertations which were written at animal welfare institutes were rather critical of the cages (e. g. Hanover: Sewerin 2002, Thum 2009, Brügesch 2015; Munich: Hergt 2007, Weigl 2007, Telle 2009, Lee 2012, Probst 2013, Louton 2014), while those produced at the Animal Breeding Institute in Hanover (with industry funding) were consistently positive about cages (e.g. Leyendecker 2003, Vits 2005, Weitzenbürger 2005, Rönchen 2007, Scholz 2007, Fischer 2009).

## Cost calculations

For German conditions, cost calculations are available as well as evaluations of the economics of practical farms. At first, calculations will be considered.

At the time of the conversion to new housing systems, various comparative calculations were published. Examples from the Chambers of Agriculture of Lower Saxony and North Rhine-Westphalia are given below (Table 10, Table 11).

**Table 10: Costs of egg production in different husbandry systems, Euro per hen and year (Schierhold 2006)**

	konv. Käfige	ausgestaltete Käfige	Boden	Voliere	Freiland	Kleingruppen
Vermarktungsfähige Eier / Platz	266	262	243	245	232	262
Festkosten / Ei	0,009 €	0,012 €	0,013 €	0,013 €	0,015 €	0,013 €
Direktkosten / Ei	0,042 €	0,042 €	0,052 €	0,051 €	0,059 €	0,045 €
Lohnansatz / Ei	0,001 €	0,007 €	0,010 €	0,007 €	0,012 €	0,007 €
Erzeugungskosten gesamt / Ei	0,051 €	0,061 €	0,075 €	0,070 €	0,086 €	0,064 €
<b>Produktionskostenerhöhung um</b>		<b>0,010 €</b>	<b>0,024 €</b>	<b>0,019 €</b>	<b>0,035 €</b>	<b>0,013 €</b>

Konv. Käfige = battery cages, ausgestaltete Käfige = enriched cages, Boden = Barn, Voliere = Aviary, Freiland = free range, Kleingruppe = small groups

Vermarktungsfähige Eier = eggs per hen, Festkosten = fixed costs, Direktkosten = direct costs, Lohnansatz = labour costs, Erzeugungskosten = sum of costs, Produktionskostenerhöhung = increase in production costs

<sup>24</sup>[https://www.ml.niedersachsen.de/startseite/themen/tiergesundheit\\_tierschutz/tierschutzplan\\_niedersachsen\\_2011\\_2018/legehennen/legehennen-110604.html](https://www.ml.niedersachsen.de/startseite/themen/tiergesundheit_tierschutz/tierschutzplan_niedersachsen_2011_2018/legehennen/legehennen-110604.html)

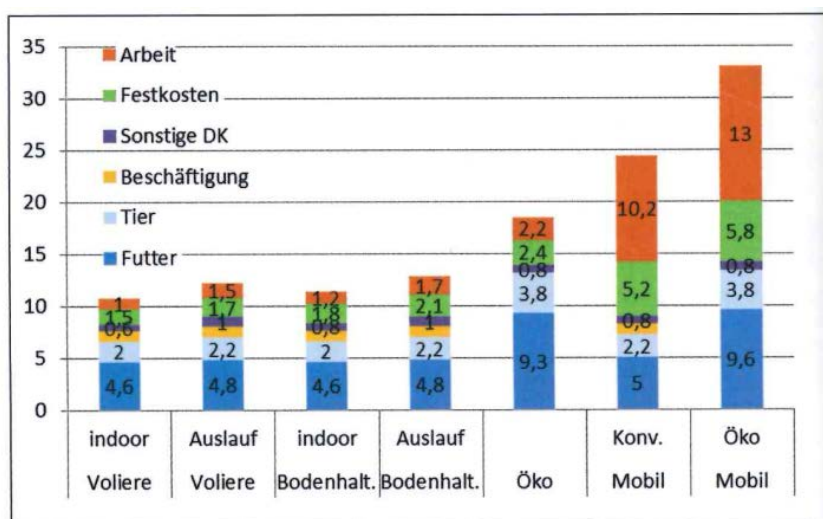
Table 11: Costs of egg production in different husbandry systems, Euro per hen and year (Simon 2008)

Plätze	Kleingruppe		Bodenhaltung m. E. <sup>25)</sup>		Bodenhaltung		Freilandhaltung	
	5.000	10.000	5.000	10.000	5.000	10.000	5.000	10.000
Festkosten je Platz in Euro	4,98	3,93	4,84	3,76	5,24	3,76	5,44	3,96
Direktkosten/Henne in Euro	14,69	14,29	15,94	15,44	16,45	15,95	17,10	16,60
Arbeitskosten/Henne in Euro	2,00	1,50	2,30	1,80	2,50	2,00	2,80	2,30
Summe	21,67	19,72	23,08	21,00	24,19	21,71	25,34	22,86
vermarktungsfähige Eier/Platz im Jahr	260		244		240		225	
Kosten pro Ei in Cent Käfighaltung (7,0 Cent b. 10.000 H)	8,3	7,6 +0,6 (8,5%)	9,4	8,6 +1,6 (22,8%)	10,0	9,0 +2,0 (28,5%)	11,3	10,1 +3,1 (44,3%)

Kleingruppe = small groups, Bodenhaltung m.E. = aviary, Bodenhaltung = barn, Freilandhaltung = free range, Plätze = hen places

Festkosten = fixed costs, Direktkosten = direct costs, Arbeitskosten = labour costs, Summe = sum of costs, Vermarktungsfähige Eier = eggs per hen, Kosten pro Ei = costs per hen (Käfighaltung = battery cages)

Figure 40 shows current **calculations of the costs** of different husbandry systems in Germany (no data for cages available), from Dr Klaus Damme, leader of Educational, Experimental and Technical Centre for Poultry and Small Livestock in Kitzingen, Bavaria (LVFZ). The Table 12 shows the assumptions for the different husbandry systems<sup>25</sup>. Free-range systems cost about 1.5 cents more than indoor systems. Organic eggs cost significantly more (about 9 cents). Floor husbandry costs about 0.7 cents more than aviary husbandry. Eggs from mobile houses are by far the most expensive. If these costs are compared with the prices paid by wholesalers shown above (see Table 8), it can be seen that farms with eggs from barns do not cover the full costs completely. In contrast, organic farms make a profit on average. However, the evaluations of the practical farms of the Thünen Institute (see below) showed that larger farms with floor husbandry can certainly make profits.



Arbeit = labour costs, Festkosten = fix costs, sonstige Direktkosten = other direct costs, Beschäftigung= occupation, Tier = pullet, Futter = feed; definition housing systems see Table 12

Figure 40: Cost calculations for different housing systems, Cent per egg (Geflügeljahrbuch 2022)

<sup>25</sup> [https://www.dlg.org/fileadmin/downloads/landwirtschaft/themen/publikationen/merkblaetter/dlg-merkblatt\\_405.pdf](https://www.dlg.org/fileadmin/downloads/landwirtschaft/themen/publikationen/merkblaetter/dlg-merkblatt_405.pdf)

**Table 12: Assumptions for the different husbandry systems**

Kennzahl	Voliere 20.000 T indoor	Voliere 20.000 T + Auslauf	Bodenhalt. 12.000 T. indoor	Bodenhalt. 12.000 T. + Auslauf	Öko 6.000 T.	Mobilstall 300 T. Konv.	Mobil- 250 T. Öko
Futterpreis	30 €/dt	30 €/dt	30 €/dt	30 €/dt	56 €/dt	30 €/dt	56 €/dt
Futter/Tier u. Jahr	43 kg	43 kg	43 kg	43 kg	45 kg	43 kg	45 kg
Junghennenpreis	5,50 €	5,50 €	5,50 €	5,50 €	10,00 €	5,50 €	10,00 €
Eizahl/AH u. Jahr	280	270	280	270	260	260	260
Investitionskosten je Platz	70 €	80 €	90 €	100 €	120 €	120 €	150 €

Voliere indoor = aviary, 20 000 places, Voliere + Auslauf: aviary, 20 000 places + outdoor run, Bodenhalt. indoor = barn, 12 000 places, + Auslauf: barn, outdoor run, Öko = organic, 6000 places, Mobilstall konv. = conventional mobile house, 300 places, Mobilstall öko = organic mobile house, 250 places

Futterpreis = feed costs (per 100 kg), Futter/Tier = feed amount per hen and year, Junghennen = pullet costs, Eizahl = laying performance (eggs per year), Investitionskosten = investment costs per hen place

KTBL (2015) calculated the **conversion costs** from small group housing to floor housing for three different flock sizes (15,000, 24,000, 40,000 places) (Table 13). The aim was to determine the times for depreciation of the enriched cages. The investment costs (dismantling of cages, installation of aviaries, adaptation of building services, e.g. ventilation, lighting) amounted to (only) approx. 10 - 12 € per hen place. Compared to this, new construction costs for aviaries with 15,000 or 24,000 places are 35 or 30 € per place, that is, about three times as high.

In addition, the KTBL also calculated the total costs of production for small group housing in the above-mentioned flock sizes (Table 14).

In the current data collection of the KTBL 2020/21 these are no longer included (not even in the online application), obviously due to lack of practical relevance.

**Table 13: Investment required for the conversion of battery cages to aviaries (KTBL 2015)**

Stallmodell	LH7002	LH7003	LH7004
Tierplätze vor Umbau [TP]	15 000	23 600	40 000
Tierplätze nach Umbau [TP]	15 000	23 600	22 800
	<b>Investitionsbedarf [€]</b>		
Demontage der Stalleinrichtung Kleingruppenhaltung <sup>1)</sup>	2.083	3.154	5.685
Einbau neuer Volierengestelle	171.214	237.931	229.784
Anpassung der Stalltechnik – pauschal	8.450	11.870	11.870
<b>Summe je Stall</b>	181.747	252.954	247.339
<b>Summe je TP (nach Umbau)</b>	12,12	10,72	10,85

<sup>1)</sup> Entsorgungskosten werden nicht veranschlagt. Annahme: Die Entsorgungskosten für Kunststoffe u. ä. gleichen sich mit den Erlösen für das Altmetall aus.

Stallmodell = type of house, Tierplätze = hen places, Investitionsbedarf = investment costs, Demontage = Dismantling, Einbau neuer Volieren = new aviaries, Summe je Stall = sum per house, Summe je TP = sum per hen

Table 14: Costs of keeping small groups in different herd sizes (KTBL 2015)

Tab. 4: Leistungen, Kosten, Erfolgsgrößen

Kennwert	Legehennenhaltung in Kleingruppenhaltung		
	Tierplätze (TP)		
	15 000	23 600	40 000
LEISTUNGS-KOSTENRECHNUNG	€/ (TP · a)		
Leistungen	20,00	20,00	20,00
Variable Kosten	17,26	17,26	17,26
<b>Deckungsbeitrag</b>	<b>2,74</b>	<b>2,74</b>	<b>2,74</b>
Fixe Arbeiterledigungskosten	4,37	3,56	2,86
<b>Direkt- und Arbeiterledigungs-kosten</b>	<b>21,63</b>	<b>20,82</b>	<b>20,13</b>
Gebäudekosten	3,28	2,93	2,68
<b>Einzelkostenfreie Leistung</b>	<b>-4,91</b>	<b>-3,75</b>	<b>-2,81</b>
ARBEITSPRODUKTIVITÄT	€/AKh		
Deckungsbeitrag	11,18	13,79	17,23
Direkt- und arbeitserledigungs-kostenfreie Leistung	-6,68	-4,19	-0,85
Einzelkostenfreie Leistung	-20,11	-18,97	-16,95
STÜCKKOSTEN	€/Ei		
Direktkosten	0,06	0,06	0,06
Variable Kosten	0,06	0,06	0,06
Direkt- und Arbeiterledigungskosten	0,08	0,07	0,07
Einzelkosten	0,09	0,08	0,08
Arbeiterledigungskosten	0,02	0,01	0,01

TP = hen place, AKh = working hour, Ei = egg; Tierplätze = hen places, Leistungen = revenues, variable Kosten = variable costs, Deckungsbeitrag = contribution margin, Gebäudekosten = Building costs, Direktkosten = direct costs, Arbeiterledigungskosten = costs of work completion

Economic **evaluations of practical farms** are listed below:

- Zapf and Damme (2012) compared 6 conventional and 6 organic farms in Bavaria in 2010/11.
- Thobe and Haxsen (2013) recorded the costs on 65 farms with aviaries or small groups (47 / 18) in 2011/12.
- From Baden-Württemberg, regular evaluations of 12 - 18 farms are available (2009 - 2019), with different types of housing (floor, free-range, mobile)<sup>26</sup>,
- In the Poultry Yearbook 2022, a table with an evaluation of 58 farms (7 of which are organic) is reproduced, but without information on housing systems.

Thobe and Haxsen (2013) evaluated production costs on 65 German farms with aviaries or enriched cages. The evaluation was carried out separately for each of four flock sizes (< 3000, 3000 - 10,000, 10,000 - 20,000, > 20,000 places) (see Figure 41). In enriched cages, the production costs per egg decrease with increasing flock size. Larger farms had higher laying yields and obtained discounts on the purchase of inputs. In addition, a degression in building and labour costs can be observed. However, revenues also decreased with increasing flock size. Smaller farms used direct marketing more often.

<sup>26</sup> [https://www.km-bw.de/pb/site/pbs-bw-new/get/documents/MLR.LEL/PB5Documents/lel/Abteilung\\_2/Oekonomik\\_der\\_Betriebszweige/Tierhaltung/Gefluegel/extern/BZA%20LegehennenBW.pdf](https://www.km-bw.de/pb/site/pbs-bw-new/get/documents/MLR.LEL/PB5Documents/lel/Abteilung_2/Oekonomik_der_Betriebszweige/Tierhaltung/Gefluegel/extern/BZA%20LegehennenBW.pdf)

In principle, similar relationships existed among the farms with aviaries. Only in the larger cage farms was there a positive balance (revenues minus costs). In contrast, it was always positive in the aviary farms (see Table 15). Farms with aviaries had slightly higher costs, but also achieved better prices.

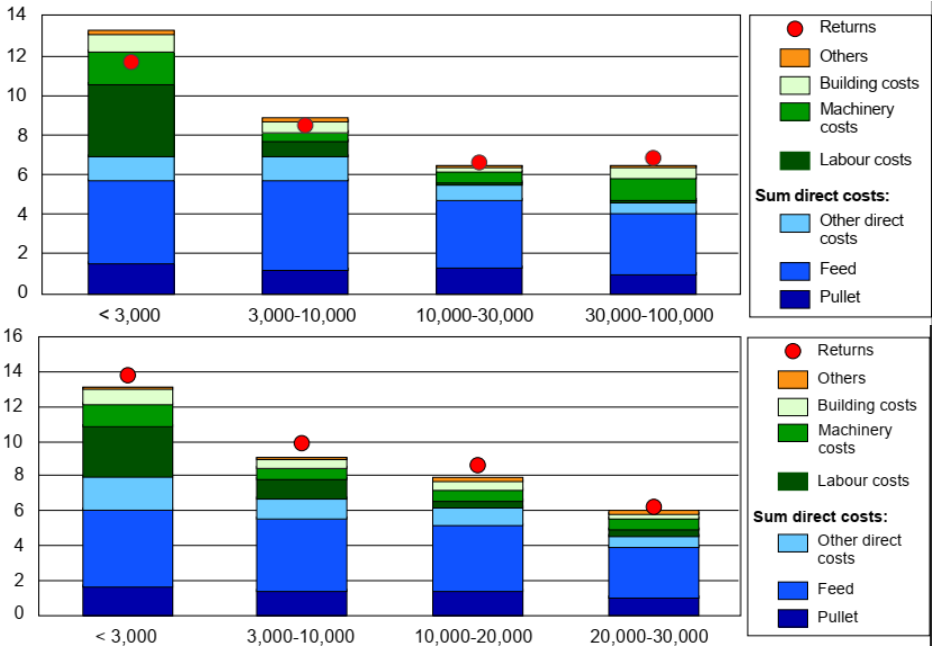


Figure 41: Revenues and production costs in enriched cages (above) and in aviaries (below), Cent per egg (Thobe & Haxsen 2014)

Table 15: Profits in practice farms, revenues minus costs, Cent per egg (Thobe & Haxsen 2013)

Hen places	< 3000	3000 - 10,000	10,000 - 20,000	> 20,000
Enriched cages	-1,52	-0,39	0,21	0,36
Aviaries	0,72	0,86	0,86	0,30

Table 16 shows the distribution of data from the same study for 47 farms with aviaries and 18 farms with small groups (enriched cages) for some economically important characteristics. Median hen places were relatively similar (22,000 vs. 30,780). Table 17 and Table 18 show in addition returns and costs for different flock size classes.

However, the Thünen Institute's data was collected ten years ago. Since then, no new evaluations on enriched cages are available. Egg prices and costs have changed in recent years.

**Table 16: Distribution of data for farms with aviaries or small groups (Campe et al. 2015)**

	Aviary					Small-Group				
	Mean	Median	SD	Min	Max	Mean	Median	SD	Min	Max
<b>Block d: Outcome Variables</b>										
Returns (Cent/Egg) <sup>1</sup>	10.60	10.48	3.38	2.20	17.56	9.64	8.54	3.66	4.53	17.69
Direct Costs (Cent/Egg) <sup>1</sup>	6.65	6.09	1.83	0.31	10.44	6.36	5.95	1.59	4.57	10.94
Net Total (Cent/Egg) <sup>1</sup>	0.93	0.76	1.64	-2.97	4.78	-0.14	0.26	2.04	-6.02	4.80
<b>Explanatory Variables</b>										
<b>Block a: Animal Associated Productivity</b>										
Laying Performance (Eggs/Hen and Year)	278.87	286.00	30.05	160.95	321.84	281.02	289.57	36.23	215.03	323.88
Age at 50 % Laying Performance (Weeks)	21.65	22.00	1.25	19.00	24.00	22.35	22.75	1.59	19.00	25.50
Feed Conversion Rate (g/Egg)	146.84	142.96	25.24	109.01	252.08	147.52	145.90	20.43	123.11	200.14
Breed	- <sup>5</sup>					- <sup>5</sup>				
Rearing System	- <sup>2</sup>					- <sup>2</sup>				
<b>Block b: Indirect Management</b>										
Mortality (%)	10.46 <sup>5</sup>	9.67	5.70	1.62	30.00	6.81	5.05	4.18	3.00	18.06
Farm Size (Number of Hens)	52596	22000	96850	2300	580000	71140	30780	105467	2500	342840
Injuries after Housing	- <sup>2</sup>					- <sup>2</sup>				
Mortality after Housing (%)	- <sup>2</sup>					- <sup>2</sup>				
Age of Layer House Equipment (Years)	2.53	2	3.06	0	11	1.47 <sup>5</sup>	1	1.26	0	4
Age of Layer House Building (Years)	21.25	20	18.74	0	56	17.58 <sup>5</sup>	22	16.24	0	43

**Table 17: Returns and costs of egg production in enriched cages with different farm sizes (Thobe & Haxsen 2014)**

Size class	Number of hens placed				
		< 3,000	3,000-10,000	10,000-30,000	30,000-100,000
Number of farms per class		6	5	4	3
Returns	ct/egg	11,72	8,52	6,65	6,84
Costs					
Pullet	ct/egg	1,61	1,23	1,43	1,07
Feed	ct/egg	4,13	4,60	3,39	3,11
Marketing and packaging	ct/egg	0,44	0,26	0,10	0,06
Other direct costs	ct/egg	0,87	0,87	0,59	0,43
Labour and machinery costs	ct/egg	5,22	1,26	0,72	1,25
Labour	ct/egg	3,59	0,80	0,21	0,13
Machinery	ct/egg	1,63	0,46	0,51	1,13
Building costs	ct/egg	0,90	0,51	0,17	0,49
Other costs	ct/egg	0,07	0,18	0,03	0,06
Sum direct costs	ct/egg	7,05	6,95	5,52	4,68
Total costs	ct/egg	13,24	8,91	6,44	6,48
Profit	ct/egg	-1,52	-0,39	0,21	0,36
Gross margin	ct/egg	5,98	2,69	1,83	2,66
Direct cost free performance	ct/egg	4,67	1,57	1,13	2,16
Flock size	hens/flock	1.100	5.155	22.585	86.479
Farm size	hens/farm	7.333	26.232	56.170	293.560
Price for pullets	€/animal	4,83	4,00	4,51	3,55
Price for feed	€/dt	27	30	23	24
Wages	ct/egg	3,59	0,80	0,21	0,13
Direct marketing	%	44	10	7	1
Raw commodity	%	41	36	0	84
Eggs weight class "L"	%	44	38	11	13
Egg production	eggs/hen placed/year	250	268	283	301
Marketable eggs	eggs/hen placed/year	239	258	268	288
Mortality	% eggs/hen placed	8,62	6,53	5,84	6,49
Feed intake	g/egg	153	153	144	128

**Table 18: Returns and costs of egg production in aviaries with different farm sizes (Thobe & Haxsen 2014)**

<b>Size class</b>	<b>Number of hens placed</b>	<b>&lt; 3,000</b>	<b>3,000–10,000</b>	<b>10,000–20,000</b>
Number of farms per size class		11	16	14
Returns	ct/egg	13,87	10,00	8,75
Costs				
Pullet	ct/egg	1,70	1,43	1,49
Feed	ct/egg	4,46	4,19	3,78
Marketing and packaging	ct/egg	0,91	0,52	0,31
Other direct costs	ct/egg	1,00	0,63	0,69
Labour and machinery costs	ct/egg	4,18	1,79	1,02
Labour	ct/egg	2,93	1,12	0,39
Machinery	ct/egg	1,25	0,67	0,62
Building costs	ct/egg	0,83	0,56	0,50
Other costs	ct/egg	0,06	0,03	0,09
Sum direct costs	ct/egg	8,07	6,77	6,28
Total costs	ct/egg	13,15	9,14	7,89
Profit	ct/egg	0,72	0,86	0,86
Gross margin	ct/egg	7,71	4,39	3,47
Direct cost free performance	ct/egg	5,79	3,23	2,47
Flock size	hens/flock	1.491	4.734	14.878
Farm size	hens/farm	7.555	21.856	70.221
Price for pullets	€/animal	4,90	4,43	4,46
Price for feed	€/dt	27,89	27,81	27,18
Wages	ct/egg	2,93	1,12	0,39
Direct marketing	%	31	12	4
Raw commodity	%	0	37	50
Eggs weight class “L”	%	35	28	17
Egg production	eggs/hen placed/year	248	274	278
Marketable eggs	eggs/hen placed/year	241	264	270
Mortality	% eggs/hen placed	10	12	10
Feed intake	g/egg	157	151	139

Table 19 shows an evaluation of the profitability of **18 farms with alternative housing systems in Baden-Württemberg** over three years. The farms had different housing systems (floor, free-range, mobile house). On average, just below 6,000 hens were kept. The costs of production were covered for the third year in a row. Therefore, the economic situation is positive for the average farm. In 2019/20, in the same sample, the labour income was even higher with 18.68 € per hen per year or 6.26 cents per egg (income €57.01 per hen, total costs €38.33) (Geflügeljahrbuch 2021, p. 56). Therefore the situation remains positive.

**Table 19: Evaluation of the profitability of 18 farms in Baden-Württemberg (Thünen Inst. 2021)**

	unit	Min. 18/19	Max. 18/19	2018/19	2017/18	2016/17
Hens per farm	<i>D-hen</i>	664	18574	<b>5.791</b>	5.401	5.073
Eggs per hen and year	<i>eggs</i>	248	311	<b>293</b>	288	294
Feed amount per hen and day	<i>g</i>	112	142	<b>121</b>	119	122
Feed amount per egg	<i>g</i>	136	177	<b>152</b>	153	151
Revenue per egg	<i>ct</i>	14,62	23,30	<b>18,86</b>	18,85	17,86
Special costs per egg	<i>ct</i>	9,33	17,35	<b>12,95</b>	13,39	12,62
thereof feed	<i>ct</i>	3,88	6,12	<b>5,13</b>	5,08	5,05
Pullet costs	€	4,90	7,46	<b>6,12</b>	6,00	6,01
Revenue per hen	€	0,08	4,00	<b>0,74</b>	0,83	0,78
Documented hen losses	%	4,3	46,7	<b>13,6</b>	16,5	13,8
Overall losses	%	4,8	47,1	<b>14,9</b>	18,5	15,2
Feed costs per 100 kg	€/100kg	27,5	40,44	<b>33,91</b>	33,32	33,45
Revenue per hen and year	€/hen	<b>43,18</b>	<b>66,60</b>	<b>55,18</b>	<b>53,76</b>	<b>52,52</b>
Feed costs per hen	€/hen	11,81	18,83	<b>15,00</b>	14,51	14,83
Impairment	€/hen	2,76	9,46	<b>5,55</b>	5,39	5,15
Interest on animal capital	€/hen	0,09	0,29	<b>0,17</b>	0,16	0,14
Depreciation building / equipment	€/hen	0,58	10,93	<b>5,78</b>	6,28	6,20
Repairs	€/hen	0,01	0,88	<b>0,30</b>	0,52	0,31
Energy and water costs	€/hen	0,42	1,7	<b>1,2</b>	1,2	1,17
Hygiene, animal health	€/hen	0,31	1,4	<b>0,7</b>	0,76	0,66
Proportional costs	€/hen	0,39	1,05	<b>0,68</b>	0,61	0,70
Other costs	€/hen	0,17	1,3	<b>0,54</b>	0,58	0,47
Wages for external labour	€/hen	0	8,62	<b>2,4</b>	2,04	1,91
Marketing	€/hen	1,4	8,27	<b>5,46</b>	6,05	5,5
<b>Sum of costs</b>	€/hen	<b>28,46</b>	<b>45,41</b>	<b>37,77</b>	<b>38,09</b>	<b>37,04</b>
<b>Labour income per hen</b>	€	<b>6,77</b>	<b>28,52</b>	<b>17,41</b>	<b>15,67</b>	<b>15,48</b>
<b>Labour income per egg</b>	<i>ct</i>	<b>2,40</b>	<b>10,06</b>	<b>5,91</b>	<b>5,42</b>	<b>5,24</b>

In the Geflügeljahrbuch 2021 (p. 59) (Poultry Yearbook) another **evaluation of 58 commercial farms** is shown (final report to BLE 2019), 7 organic and 51 conventional, thereof 36 below 10,000 hen places and 15 above 10,000 places (no further information given). Smaller conventional farms had a sum of costs of 25.70 € per hen and year and bigger farms of 18.66 € (without marketing costs), respective 9.8 vs. 7.0 Cent per egg. The smaller farms had also higher costs in all sub-sectors (e.g. pullet 5.18 vs. 4.14 €, feed 12.28 vs. 10.28 €, fix costs 5.28 vs. 2.42 € per hen and year), which can be explained by depression. However, the costs were somewhat lower than in Table 19 presented evaluation from Baden-Wuerttemberg (may be because of less free-range farms). Revenues were not presented, nor were profits.



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### PhD theses on enriched cages

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