Chapter

# Schwäbisch-Hällisches Pig

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## Abstract

The traditional, local breed Schwäbisch-Hällisches Schwein is originally located in the region of Hohenlohe in Baden-Württemberg, which still is the main breeding area. The breed was developed since nearly 200 years ago by the local farmers and is well adapted to the regional conditions. Next to the genetic value of the old breed in terms of biodiversity, it is the basement for a sustainable local pork chain. In terms of scientific substantiation, their performances and products are mainly untapped. Thus the aim of the present chapter is to present history and current status of Schwäbisch-Hällisches pig breed, its exterior phenotypic characteristics, geographical location, production system and main products from this German autochthonous breed of pigs, one of the local pig breeds investigated in the project TREASURE. Moreover, a collection and review of available literature data, available until August 2017, on reproductive and productive traits of Schwäbisch-Hällisches pig breed were carried out. Meat quality of *longissimus* muscle completed the conventional productive traits as it is of great interest in autochthonous breeds. Although studies on Schwäbisch-Hällisches pig are scarce, current review gives the first insight into this local pig breed.

**Keywords:** traditional European breed, TREASURE, productive traits, phenotype, Schwäbisch-Hällisches, Germany

## 1. History and current status of the breed (census)

The Schwäbisch-Hällisches is a breed of domestic pig originating from Schwäbisch Hall in Baden-Württemberg. It is the oldest autochthonous pig breed in Germany. Arising in 1821, when Chinese pigs were crossed with local pigs in Württemberg, the breed got regional importance in Northern Württemberg [1–3]. The fact that this breed developed most successfully in the area of Schwäbisch Hall explains its name. In the following decades, the breed was prosperous in many parts of Württemberg. At the beginning of the twentieth century, the import of pig breeds from England leads to a melting pot of different breeds, and the original Schwäbisch-Hällisches could only be found in its traditional region Schwäbisch Hall/Hohenlohe. With the establishment of breeding associations in the 1920s, the breed developed well and population increased [4]. The most remarkable prosperity period in its long history was the 1950s. The highest population of 3149 herdbook animals, which means 12% of the West-German pig herdbook population, was counted in 1954 [5–7]. Next to herdbook sows, there were counted about 18,000 Schwäbisch-Hällisch sows in 1939 and about 33,000 in 1955 [8, 9]. The low lean meat content of the breed together with a rapidly decreasing demand for fat caused the demise of Schwäbisch-Hällisch pigs in the 1960s and 1970s. The herdbook was closed in 1970, and only few farmers preserved the breed in their herds. In the

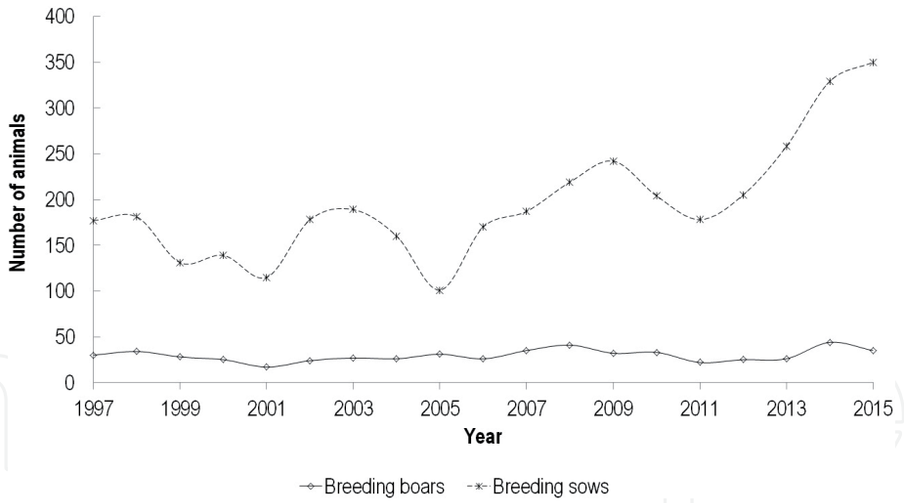


**Figure 1.**
*Census of Schwäbisch-Hällisches pig breed, presenting number of sows and boars per year, development since the late 1990s.*

1980s, the breed was nearly extinct [3]. The Schwäbisch-Hällisch pig was saved by the Farmers' Association of Schwäbisch Hall (BESH), which was build up to find new sales channels for the old breed. The breeding association Züchtervereinigung Schwäbisch-Hällisches Schwein (ZVSH) started in 1986. Two years before, the registration of few remaining sows and boars founded the new herdbook of the old breed. Nowadays the pigs are slaughtered at a slaughterhouse owned by BESH, and the meat products are sold in the regional marketing programme with focus on prominent meat quality. As a consequence of the success of the marketing programme, the population recovered in the following years and grew until now in a sustainable way. Presently there are 15 registered farms of Schwäbisch-Hällisches pig with about 350 breeding sows and 35 boars in the latest available status (August 2015). Moreover there are more than 3000 sows which are used for cross-breeding [10]. The census of Schwäbisch-Hällisches pig breed is presented in **Figure 1**.

## 2. Exterior phenotypic characteristics

The Schwäbisch-Hällisches pig breed morphology information is summarised in **Table 1**. It is a medium to large size breed, white in the centre, with a black head and rear and narrow grey bands at the transition from white to black skin (**Figures 2** and **3**). The legs are white in general. The breed's typical attributes are furthermore large lop ears and, as a heritage of the Chinese pigs, a wrinkled forehead. The Schwäbisch-Hällisches is a typical mother breed. Due to breeding activities towards high fertility and milk production, the number of teats is high (**Table 1**). On average there are 15–16 teats per animal [10, 11].

| Measurement (average) | Adult male | Adult female |
|---|---|---|
| Body weight (kg) | 350 | 280 |
| Ear length (cm) | 28 | 27 |
| Height at withers (cm) | 95 | 86 |
| Number of teats | 14–20 | 14–20 |

**Table 1.**
*Summary of morphology information on Schwäbisch-Hällisches pig breed.*

**Figure 2.**
*Schwäbisch-Hällisches sow with piglets.*

**Figure 3.**
*Schwäbisch-Hällisches boar.*

## 3. Geographical location and production system

Schwäbisch-Hällisches pig is raised mainly in the region of Hohenlohe in Baden-Württemberg, Germany. The traditional and actual locations of Schwäbisch-Hällisches pig are in particular the administrative districts Schwäbisch Hall, Hohenlohe, Rems-Murr, Tauberbischofsheim, Ostalbkreis and Ansbach (all in all about 8000 $km^2$). Moreover there are, with lower density, Schwäbisch-Hällisch pigs in some neighbour districts of the core region and in addition singular farms in other parts of Germany, also in Austria [10]. The animals are housed in barns where they have, in comparison to the conventional German pig husbandry, more space allowance and additional straw bedding [3, 12]. The farms are, typical for the region, small and medium scaled, which means that they are family farms with, in most cases, no other employees. High standards, namely, the raising and slaughtering in the autochthon area of the breed, animal friendly husbandry, abandonment of antibiotics in the fattening period and GMO-free feeding, fulfil the PGI specification and therefore allow the farmers to sell the pigs in this programme (Protection of Geographical Indications), a standard given by the European Commission [13]. In summer, there are also pigs on the pasture. The pastures are equipped with shelters and feeding/water stations. Additional to free intake of grass, these pigs have access to a feed mixture based on grain, acorn and a protein source. The outdoor keeping and the acorn feeding are two special traits which define significantly the premium programme "Eichelmastschwein" [14].

## 4. Organisations for breeding, monitoring and conservation

Since 1986, Schwäbisch-Hällisches pig breed is run and monitored by the breeding association ZVSH.[1] Fifteen herdbook breeders perform pure breeding through planned mating to preserve and develop the breed Schwäbisch-Hällisches pig. Special attention is given to the nine different boar lines of the population and avoidance of inbreeding in general. Artificial insemination (four boars are on a boar station) as well as natural mating is practised. A defined sample of semen is stored in a national cryobank. The selection of young breeding animals takes place with an age of 6–7 months. Only the best animals regarding pedigree, conformation and growing can be used for pure breeding later on. The BLUP animal model is used for breeding value estimation [10].

## 5. Productive performance

### 5.1 Reproductive traits

Basic data obtained on reproductive traits in this review are presented in **Table 2**. The age of sows at first parturition is approximately 12.7 months [17, 18]. The sows of Schwäbisch-Hällisches pig breed have 2.2 litters per year [15, 17] with 10.6–11.6 piglets [15–17] of 1.6 kg live body weight [16, 17]. Stillborn percentage of piglets is 5.7% [16], whereas piglet mortality rate until weaning in the considered studies ranges between 5.6 and 10.3% [15–17]. Duration of lactation is prolonged in comparison to modern intensive systems (to 32 days [16]); the length of the farrowing interval 169 [15, 17] is higher as well. Although data on reproduction performance of Schwäbisch-Hällisches pig breed are scarce, it can be concluded that this breed of pigs has excellent fertility, especially in comparison to other traditional breeds of pigs.

### 5.2 Growth performance

Basic data on growth performance obtained in this review are presented in **Tables 3** and **4**. Due to big differences between studies with regard to the live weight range covered, we defined the stages for growth performance as stage of lactation and growing phase (in this case from birth to approximately 30 kg

| Reference | Sow age at first parturition (mth) | Litters per sow per year | No. of piglets alive per litter | Piglet live weight (kg) | Stillborn per litter (%) | Mortality at weaning (%) | Duration of lactation (d) | Farrowing interval (d) |
|---|---|---|---|---|---|---|---|---|
| [15] | – | 2.2 | 10.6 | – | – | 5.6 | – | 167 |
| [16] | – | – | 11.6 | 1.6 | 5.7 | 10.3 | 32 | – |
| [17] | 13.3 | 2.1 | 10.7 | 1.6 | – | 9.3 | – | 171 |
| [18] | 12.0 | – | – | – | – | – | – | – |

*No. = number, mth = month, d = days.*

**Table 2.**
*Summary of collected literature data on reproduction traits in Schwäbisch-Hällisches pig breed.*

[1] Züchtervereinigung Schwäbisch-Hällisches Schwein (ZVSH); Raiffeisenstraße 5, 74,549 Wolpertshausen, Germany; Web address: https://www.besh.de/erzeuger/zvsh/; E-Mail address: christoph.zimmer@besh.de

| Reference | Feeding | No. of animals | ADG lactation and growing[1] | ADG fattening[2] | | | ADG birth-slaughter |
|---|---|---|---|---|---|---|---|
| | | | | Early | Late | Overall | |
| [16] | – | 25 | 404 | – | – | 761 | – |
| | – | 24 | 406 | – | – | 760 | – |
| | – | 9 | 403 | – | – | 763 | – |
| [18] | – | – | – | – | – | 850 | – |
| [19] | – | 40 | 355 | – | – | 800 | – |
| [20] | – | – | 378 | – | – | 776 | – |
| [21] | – | – | 384 | – | – | 773 | – |
| [22] | Ad Lib | 51 | – | – | – | 828 | – |
| [23] | – | 31 | – | – | – | 700 | – |
| [24] | – | 147[3] | 420 | 671 | 730 | 721 | 609 |

*No. = number; ADG = average daily gain in g; Ad Lib = ad libitum feeding regime.*
*[1]ADG in lactation and growing period estimated from birth to approximately 30 kg live body weight.*
*[2]ADG in period of fattening is reported for early and late fattening stages estimated between approximately 30–60 kg and above 100 kg live body weight, respectively. Sometimes the source provided only the overall growth rate for the whole studied period (in that case defined as the overall).*
*[3]The average number of animals observed (min 52, max 210).*

**Table 3.**
*Summary of collected literature data on growth performance in Schwäbisch-Hällisches pig breed.*

| Reference | Feeding | ME content of feed (MJ/kg) | CP content of feed (%) | No. of animals | ADFI fattening[1] | | |
|---|---|---|---|---|---|---|---|
| | | | | | Early | Middle | Overall |
| [19] | – | 16 | 17 | 40 | – | – | 2.39 |
| [20] | – | 14 | 17 | – | – | – | 2.34 |
| [21] | – | 13 | 16 | – | – | – | 2.42 |
| [22] | Ad Lib | 13 | – | 51 | 2.45 | 2.45 | – |
| [23] | – | – | – | 31 | 1.98 | 2.34 | – |

*No. = number, ADFI = average daily feed intake in kg/day; Ad Lib = ad libitum feeding regime, ME = metabolisable energy, CP = crude protein.*
*[1]ADFI in a period of fattening is reported for early, middle and late fattening stages estimated between approximately 30–60 kg and 60–100 kg live body weight, respectively. Sometimes the source provided only the overall daily feed intake for the whole studied period (in that case defined as overall).*

**Table 4.**
*Summary of collected literature data on average daily feed intake (in kg/day) in Schwäbisch-Hällisches pig breed.*

live body weight) and the overall growth rate for the whole fattening stage (defined as overall). There is data about the growth from birth to slaughter as well. It should also be noted that majority of collected studies simulated practical conditions of the production systems used. Only the study of Brandt et al. [22] actually aimed at evaluating the breed potential for growth in ad libitum conditions of feeding, showing that maximal growth rate of Schwäbisch-Hällisches pig is 828 g/day in overall fattening stage (observed from 32 to 115 kg live weight; [22]). The average daily gain in the stage of lactation and growing phase was approximately 393 g/day (355–420 kg/day [16, 19–21, 24]) and 773 g/day in the overall fattening stage (700–850 kg/day [16, 17–24]), which is comparable to modern breeds of pigs.

In considered studies, the information on feed intake and feed nutritional value were limited (max n = 3), which also limits the evaluation of growth potential. Average daily feed intake increased from approximately 2.2 kg/day in the early fattening stage to approximately 2.4 kg/day in middle fattening stage [22, 23], whereas average daily feed intake in the overall fattening stage was in average 2.4 kg/day [19–21].

### 5.3 Body composition and carcass traits

Basic data obtained in this review with some of the most commonly encountered carcass traits that could be compared are presented in **Table 5**. In considered studies, pigs of Schwäbisch-Hällisches pig breed were slaughtered at approximately 183 days of age (178–192 days [19–21]) and at an average of 112 kg live weight (109–120 kg [19–23]) and reached an average dressing yield of 76% (74–78% [19–23]). The backfat thickness value measured on the withers was 46 mm [22] and at the position of the last rib 28 mm in average [19–22]. Within the considered studies, lean meat content was approximately 52% [22, 23], and loin eye area of *longissimus* muscle was 40 $cm^2$ [22, 23].

### 5.4 Meat quality

Basic data obtained in this review with some of the most commonly encountered meat quality traits measured in *longissimus* muscle that could be found are presented in **Table 6**. In few studies reporting meat quality of Schwäbisch-Hällisches pig, pH measured in *longissimus* muscle at 45 min and 24 h *post mortem*

| Reference | No. of animals | Final age (d) | Final BW (kg) | Hot CW (kg) | Dressing yield (%) | Lean meat content (%) | Backfat thickness (mm) | | Loin eye area ($cm^2$) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | withers | last rib | |
| [18] | – | – | – | 90 | – | – | – | – | – |
| [19] | 40 | 178 | 109 | 85 | 77.6 | – | – | 29 | – |
| [20] | 55 | 178 | 109 | 84 | 77.4 | – | – | 29 | – |
| [21] | 56 | 192 | 110 | 94 | 76.6 | – | – | 30 | – |
| [22] | 51 | – | 115 | 85 | 74.4 | 51.7 | 46 | 25 | 40 |
| [23] | 31 | – | 120 | – | 76.2 | 52.9 | – | – | 41 |

*No. = number, BW = body weight; CW = carcass weight.*

**Table 5.**
*Summary of collected literature data on body composition and carcass traits in Schwäbisch-Hällisches pig breed.*

| Reference | No. of animals | pH 45 | pH 24 | Intramuscular fat content (%) |
|---|---|---|---|---|
| [19] | 40 | 6.38 | 5.48 | 2.1 |
| [20] | 55 | 6.41 | 5.55 | 2.3 |
| [21] | 56 | 6.65 | 5.62 | 2.1 |
| [23] | 31 | – | – | 1.8 |

*No. = number, pH 45 = pH measured approximately 45 min post mortem; pH 24 = pH measured approximately 24 h post mortem.*

**Table 6.**
*Summary of collected literature data on meat fat quality in Schwäbisch-Hällisches pig breed.*

were 6.48 and 5.55 [19–21], respectively. The intramuscular fat content ranged from 1.8 to 2.3% [19–23], whereas data providing measurements of objective colour and fatty acid composition of intramuscular fat or backfat were not provided within the considered studies.

## 6. Use of breed and main products

Fresh meat and ham, sausages and other products made of pork are sold on a premium market for high-quality regional products. The meat is labelled as protected geographical indication (PGI [25]). The pigs have to be born, raised and fattened in the county Schwäbisch Hall or in one of the five neighbouring counties. Only the herdbook breeding is allowed to take place outside the PGI region. The sausages are produced directly at the slaughterhouse. They are produced without any technological or artificial additives. Only natural ecological herbs and spices are used. For producing without phosphate, the sausages are manufactured with warm meat directly after slaughtering. The association of farmers "Bäuerliche Erzeugergemeinschaft Schwäbisch Hall" organises the marketing and distribution of the products. It has seven own markets and 350 butchers as customers. The PGI-SH-Meat is produced with special standards comprising the region, animal welfare and GMO-free feed. Next to this niche market, there are two others which are smaller: ecological meat from Schwäbisch-Hällisches pigs and Eichelschwein meat from Schwäbisch-Hällisches pigs (acorn-fed Schwäbisch-Hällisches pigs). The last production line includes obligatorily acorn feeding and outdoor keeping on the pasture and/or in the forest. Only pure breed Schwäbisch-Hällisches pigs are allowed. For the first two production lines, Schwäbisch-Hällisches pure breeds and crossbreeds with a stress-resistant boar-line are possible.

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