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Gerhard Haxsen

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Deficits of Piglet Supply in Germany

Gerhard Haxsen¹

Abstract

Piglets are becoming increasingly more scarce in Germany, especially in the north west intensive livestock regions. In general, the scarcity results from the decline of the breeding sow population. The intensive livestock regions have expanded their piglet production but this expansion was not large enough to meet the rising demand. Import and interregional trade have become more important for piglet supply.

While interregional trade data are not available, the regional situation can be analysed by a model balancing demand and supply in the districts. The analysis of demand and supply refers to data of district pig populations and an equation with a few parameters concerning the number of piglets per sow and the number of processed pig per space annually. The results are illustrated by a map showing surpluses and deficits of the districts in relation to land capacity. The computed balances vary considerably by region. The maxima of deviation are -1800 piglets per 100 ha farm land in the intensive livestock regions of North Germany and +1000 piglets per 100 ha in the Region Hohenlohe in South Germany.

Though interregional trade data are missing, the minimum volume of interregional trade can be estimated by equations determining the difference between total regional surpluses and national export which is equivalent to the difference between total regional deficits and national import. The estimated trade including import accounts for approximately 20 % of total piglet use.

The analysis of trends in regional surpluses and regional deficits refers to the data of the Länder. It illustrates the increasing deficits in North Germany, while the surpluses in the south and the east of Germany have decreased after 1996.

Keywords: Balance sheets of piglets, trade in piglets, intensive livestock regions, structure of sow holders

Zusammenfassung

Defizite der Versorgung mit Ferkeln in Deutschland

In Deutschland nimmt die Knappheit an Ferkeln zu. Betroffen sind vor allem die im Nordwesten gelegenen Veredlungsstandorte. Die zunehmende Knappheit ist eine Folge des im Trend abnehmenden Bestandes an Zuchtsauen. In den Veredlungsregionen wurde zwar die Ferkelerzeugung ausgedehnt. Der Anstieg war aber nicht groß genug, um die stark gestiegene Nachfrage zu decken. Aus dem Nachfrageüberhang resultieren zunehmende Importe und eine Ausweitung interregionaler Lieferungen an Ferkeln.

Da empirische Angaben über den interregionalen Ferkelhandel nicht verfügbar sind, erfolgt eine Berechnung von Angebot und Nachfrage in den Regionen durch ein Modell, das Aufkommen und Bedarf an Ferkeln in den einzelnen Kreisen bilanziert. Die Ergebnisse der Kreise werden an Hand einer Karte dargestellt, die Überschüsse bzw. Defizite im Verhältnis zur landwirtschaftlich genutzten Fläche wiedergibt. Die Beträge weisen eine beträchtliche Streuung auf. Die Spannweite reicht von - 1800 Ferkeln je 100 ha LF in den nordwestdeutschen Veredlungsregionen bis zu + 1000 Ferkeln je 100 ha LF in der Region Hohenlohe. Die ermittelten regionalen Überschüsse und Defizite dienen auch zur Bestimmung des Mindestumfanges interregionaler Ferkellieferungen. Diese decken zusammen mit den Importen rund 20 % des kalkulierten Inlandsbedarfes.

Zur Analyse der regionalen Versorgung über mehrere Jahre stehen nur Länderdaten zur Verfügung. Aus diesen Daten ergeben sich im Verlauf der 90er Jahre zunehmende Defizite für den Norden und abnehmende Überschüsse für den Süden und den Osten Deutschlands.

Schlüsselwörter: Ferkelbilanzen, Ferkelhandel, Veredlungsregionen, Struktur der Sauenhaltung

¹ Institute of Farm Economics and Rural Studies, Federal Agricultural Research Centre (FAL), Bundesallee 50, 38116 Braunschweig, Germany

1 Introduction

Actually, the discussion concerning the supply of piglets in Germany refers mainly to qualitative criteria like the availability of health piglets in parcels large enough to meet the requirements of pig holders demanding 100 animals or more (Hortmann-Scholten, 1999; Lentföhr, 1999). However, the supply of piglets in Germany is not only a qualitative but also a quantitative problem because the sow population is declining and its regional distribution deviates from the distribution of pigs for fattening. In the intensive livestock regions, the resources of piglets are insufficient to meet demand. The deficits induce import and interregional transport of piglets.

Piglet transport raises public discussion as to epidemic risks and animal welfare. But concrete information on the volume of the interregional transport is not available. Therefore, the objective of this article is to present quantitative information by a model illustrating the increasing scarcity of piglets in Germany and its impact on regional supply.

The dynamics of pig population make it difficult to characterise piglet supply sufficiently and transparently with few criteria. However, pig population developments can be used to illustrate the rising scarcity of piglets. Fattening pigs numbers are considered as an indicator of piglet demand and breeding sows numbers shall indicate piglet supply. Additionally, the number of processed pigs per pig space are discussed as a parameter of demand and the number of weaners annually per sow as a parameter of supply.

After considering national piglet demand and piglet supply a model is developed to analyse regional resources and uses of piglets. Its empirical data are based on livestock census and official import and export estimates.

2 National development of demand and supply

Since 1990 German breeding sow populations have not kept pace with the demand for piglets. The deviation is illustrated in Figure 1 by the indexes presenting the number of breedings sows, piglets and fattening pigs respectively. While sows and fattening pigs cycles are similar, their long run trend is different. The sow population declines, the trend of pigs for fattening is nearly constant.²

The demand for piglets has been stimulated by increased productivity from higher daily gains in weight and shorter fattening periods resulting in expanded feeding capacity per pig space annually (s. Table 1). While the number of weaned piglets increased per sow, this was more than offset by the declining sow numbers. Hence, since 1996 Germany has increasing piglet deficits.

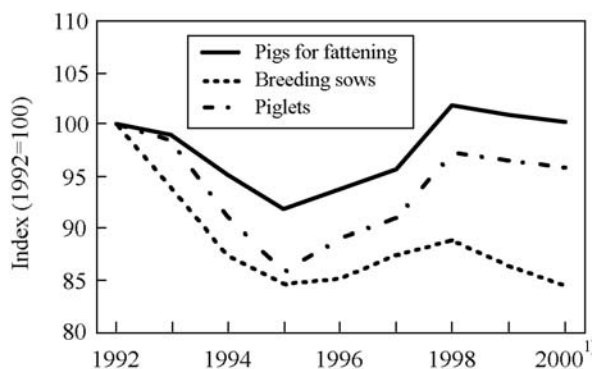
The deficits are compensated by imports mainly from

² The declining trend has been observed already in the western part of Germany since 1985 (s. Table A1 in the Appendix).

Table 1
Development of productivity in piglet production and pig fattening

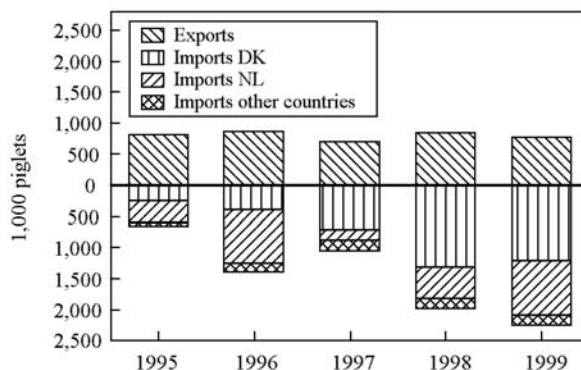
	Piglet production		Pig fattening	
	Piglets grown up annually per sow	Daily weight gain g	Period of fattening days	
1984/85	17.3	596	135.9	
1991/92	18.5	644	133.5	
1999/2000	19.8	724	124.3	
1991/92 = 100				
1984/85	93.5	92.5	101.8	
1991/92	100	100	100	
1999/2000	107.0	112.4	93.1	

Source: ZDS, own calculation



1) Preliminary.
Source: BML, ZMP, own calculation.

Fig. 1
Development of pig populations in Germany from 1992 to 2000



Source: FAL, ZMP, own calculation.

Fig. 2
Exports and imports of piglets in Germany

Table 2
Structure of sow holders and its change in Denmark, Netherlands and Germany

		Sows per holder						
		< 50	50 - 99	> 100	100 - 199	200 - 499	> 500	Total
Share of the size group in the total population (%)								
Denmark	1991	16.3	17.8	65.9	-	-	-	100
	1995	8.1	11.5	80.4	27.1	37.7	15.6	100
	1997	6.1	8.4	85.5	23.7	42.1	19.7	100
	1999	4.0	5.5	90.5	18.0	44.2	28.3	100
Netherlands	1991	5.5	12.0	82.5	-	-	-	100
	1995	3.0	8.1	88.9	31.2	41.1	16.6	100
	1997	2.3	6.8	90.9	27.9	42.4	20.5	100
	1999	1.7	5.2	93.1	23.2	-	-	100
West Germany	1991	47.8	33.4	18.8	-	-	-	100
	1995	36.7	33.3	30.0	-	-	-	100
	1997	31.8	31.9	36.3	26.3	8.1	1.8	100
Germany	1991	36.4	28.1	35.5	-	-	-	100
	1995	29.4	29.1	41.6	20.3	9.5	11.8	100
	1997	27.0	27.0	46.1	22.8	10.5	12.8	100
Development of the population in the size groups (1995 = 100)								
Denmark	1991	182.7	140.2	74.3	-	-	-	90.6
	1995	100	100	100	100	100	100	100
	1997	80.9	78.5	114.3	94.0	120.0	135.7	107.5
	1999	54.0	52.3	123.1	72.6	128.2	198.3	109.3
Netherlands	1991	182.4	148.6	93.1	-	-	-	100.2
	1995	100	100	100	100	100	100	100
	1997	79.4	86.9	105.9	92.6	106.8	127.9	103.5
	1999	51.8	58.7	95.7	67.9	-	-	91.4
West Germany	1991	143.5	109.5	68.2	-	-	-	109.6
	1995	100	100	100	-	-	-	100
	1997	84.7	93.6	118.1	-	-	-	97.7
Germany	1991	140.8	109.9	97.1	-	-	-	114.4
	1995	100	100	100	100	100	100	100
	1997	92.1	93.1	111.0	112.6	110.8	108.7	100.2

Source: Eurostat, SBA, own calculation

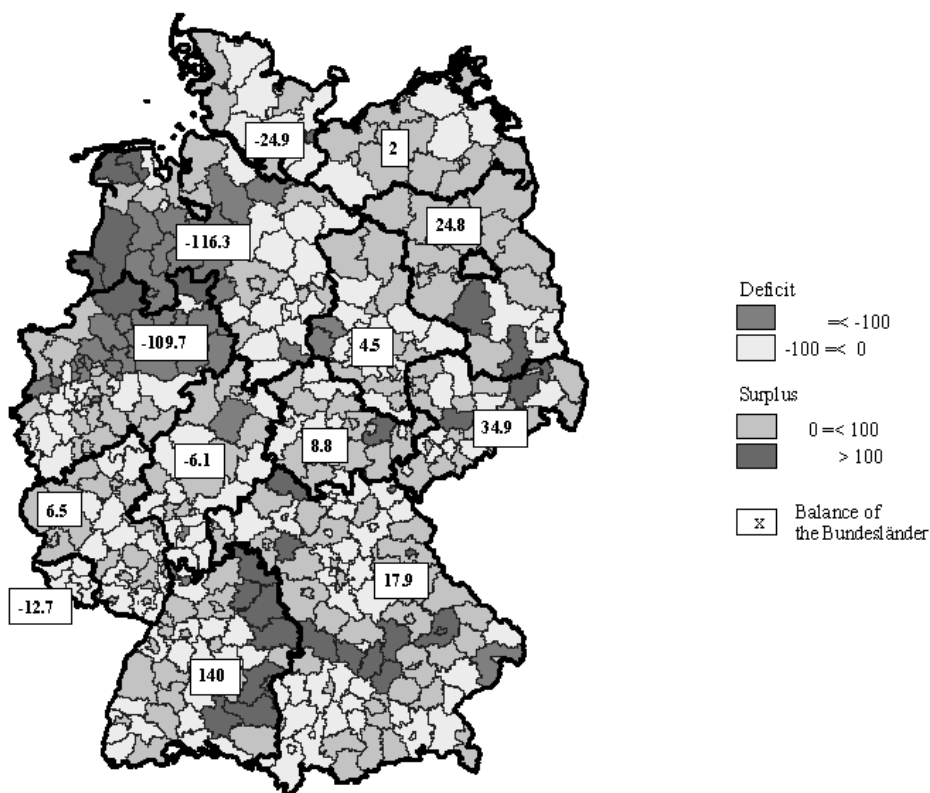
Denmark and the Netherlands (s. Figure 2); about 90 % of the imports come from these countries. They benefit from facilities to offer parcels of 100 to 200 piglets produced by one holder (Neumann, 1998). Additionally, Danish piglets have a good image in regard to health and genetic potential. (Diekmann-Lenartz, 2000).

The structural advantages of pig production in Denmark and the Netherlands are indicated by the greater share of the size groups with 100 or more sows (s. Table 2). Nearly half the sows are kept in holdings with 200 to 499 spaces, approximately a quarter is kept in holdings with 500 and more spaces. Most of the increased sow population in Denmark comes from the expansion of these groups. In Germany, the increase of holders with more

than 200 sows is not as pronounced while the share of the holdings with less than 100 sows declined less than in Denmark and in the Netherlands.

3 Regional balance sheets

Pig fattening competitiveness depends more on the availability of farm land and feed prices than piglet production. This is one reason for regionally varying piglet supplies in Germany. However, statistics on interregional trade in piglets are not available. Accordingly, the piglet supply has to be calculated by a model balancing resources and uses at regional level. The model computes the uses as the product of pig spaces and the amount of



Source: Statistisches Bundesamt, own calculation

Map 1 Regional Surpluses and Deficits of Piglets (Piglets per 100 ha farm land)³

annually processed pigs per space. It considers the population of fattening pigs registered in the census as an indicator of pig spaces to be utilised. The amount of processed pigs per annum which depends i. a. on the daily gains in weight and the length of the fattening period is valued in accordance with the extension service at 2.48 (Stiftung Westfälische Landwirtschaft, 2000).

Piglet resources are computed in the model as a product of the number of breeding sows and the average value of piglets per sow annually used for fattening (Fuchs, 1988). The average value is calculated by an equation illustrating conditions for an equilibrium of resources and uses of piglets at national level:

$$S f + I - E = P a$$

- S, P population of breeding sows and fattening pigs, respectively, registered by the census of animals
- I, E imports, exports of piglets
- f piglets for fattening annually per sow
- a processed pigs annually per space

The equation demonstrates also the impacts of some technical parameters on demand and supply. Due to the lack of detailed empirical data the parameters a and f are

valued equally in all regions. Thus, errors of aggregation caused by the use of average parameters cannot be excluded. However, the results of the model indicate:

- the minimum volume of interregional traded piglets and
- the centres of regional deficits and surpluses.

The model calculates the minimum volume of interregional trade in piglets as the difference of all regional surpluses and the exports:

$$MV = RS - E$$

The result is identical with the difference of all regional deficits and the imports:

$$MV = RD - I$$

- MV minimum value of interregional trade in piglets
- RS sum of all regional surpluses
- RD sum of all regional deficits

Balance sheets results could also be utilised for computing degrees of regional self sufficiency (Pricker, 1996). However, this often considered index will not be presented here because it does not illustrate the dimension of the surpluses and the deficits. Instead, the following comparison of the regions in regard to their supply of piglets concerns surpluses or deficits per 100 ha farm land.

³ There is a colored map at the website of the institute which is more expressive (Haxsen, 2001)

Table 3
Contribution of important¹ districts to regional deficits and surpluses

Districts in	Unit	Surpluses	Deficits
Niedersachsen and Nordrhein-Westfalen	1 000 piglets	1 169	5 696
Baden-Württemberg	1 000 piglets	1 968	
Niedersachsen and Nordrhein-Westfalen	% ²	16.9	67.7
Baden-Württemberg	%	28.4	

¹ Districts exceeding the threshold of +100 or -100 piglets per 100 ha
² Percent of total regional surpluses or deficits
Source: Own calculation

4 Results of the balance sheets

The computed balances vary considerably by region. The maxima of deviation are -1800 piglets per 100 ha farm land in the intensive livestock regions of North Germany and +1000 piglets per 100 ha in the Region Hohenlohe in South Germany.

Map 1 illustrates the varying supply by distinguishing districts with large and districts with small deficits or surpluses. The threshold value between large and small is fixed at -100 or +100 piglets per 100 ha respectively.

The districts with deficiencies exceeding the threshold of -100 piglets lie mainly in Niedersachsen and Nordrhein-Westfalen. Their share in farmland is less than 10% but their shortfall amounts to 5.7 millions (s. Table 3), accounting for nearly 70% of total regional deficits.

The most important surplus regions are the districts in the east of Baden-Württemberg and the districts in the neighbourhood of the intensive livestock regions. In all, these surpluses total to 3 millions piglets, about 40% of total regional surpluses. Surpluses of 1 million piglets exist in the districts neighbouring to the intensive livestock regions, however, they appear small in relation to the large deficits of 5.7.

The important role of deficits and surpluses in Niedersachsen, Nordrhein-Westfalen and Baden-Württemberg respectively are indicated by the numbers in the map which present the balance values of the Bundesländer per 100 ha farm land. The values of -116.3 in Niedersachsen, -109.7 in Nordrhein-Westfalen and +140 in Baden-Württemberg differ obviously from the others.

Estimated interregional trade in piglets is presented in Table 4. The computed minimum volume of interregional trade amounts to 6.2 millions piglets, nearly half (2.6 millions) generated by trade between Länder. Taking into account the export of 0.8 and the import of 2.3, the total surpluses amount to 6.9 millions piglets and the total

deficits to 8.4 millions. The interregional trade and the imports account for approximately 20% of total piglet use.

The amounts of regional surpluses and deficits presented by Map 1, Table 3 and Table 4 refer to the year 1999. However, they give little insights into trends. Therefore, Figure 3 presents balances of the Länder with deficits or surpluses larger than 100 000 piglets in 1992, 1996 and 2000. It shows that in the majority of the Länder the surpluses were largest in 1996 and have decreased in the following years because piglet demand increased more than available resources. Only in Sachsen, surpluses have expanded continuously.

Piglet production has increased slightly in North Germany but the expansion was not large enough to meet the increasing demand for piglets. Nordrhein-Westfalen, Niedersachsen and Schleswig-Holstein have permanent deficits since 1992. A large part of the deficits is compensated by surpluses in the southern and eastern parts of Germany and by imports.

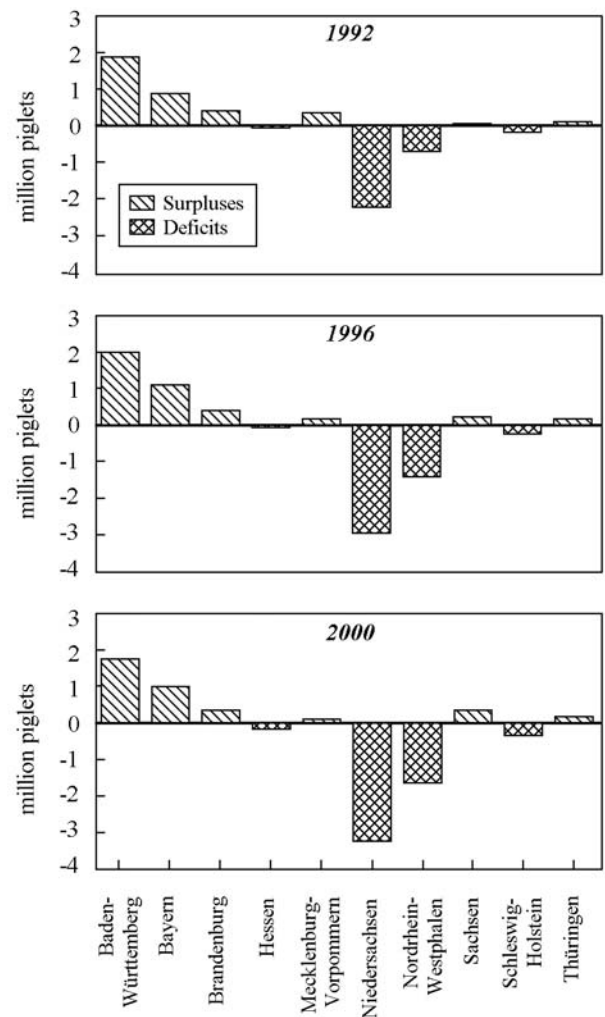


Fig. 3
Balances of piglets in the Länder with larger surpluses or deficits

Table 4
Results of the model in regard to the minimum volume of inter-regional trade in piglets

	Surplus Disposition 1 000 piglets			Deficit Accommodation 1 000 piglets		
	within Germany	Exports	Total	within Germany	Imports	Total
Länder	2 645	772	3 416	2 645	2 258	4 903
Districts	6 162	772	6 934	6 162	2 258	8 420

Source: SBA, BML, own calculation

Appendix: Table A1
Development of pig population in Germany

	1 000 animals			1992 = 100		
	Piglets	Pigs for fattening	Breeding sows	Piglets	Pigs for fattening	Breeding sows
West Germany						
1980	6 099	13 710	2 636	104.8	99.3	109.5
1981	6 017	13 624	2 563	103.4	98.7	106.5
1982	6 073	13 670	2 622	104.4	99.1	108.9
1983	6 360	14 251	2 723	109.3	103.3	113.1
1984	6 535	14 209	2 758	112.3	103.0	114.6
1985	6 968	14 328	2 871	119.7	103.8	119.3
1986	6 823	14 711	2 852	117.3	106.6	118.5
1987	6 558	14 353	2 652	112.7	104.0	110.2
1988	6 098	13 962	2 423	104.8	101.2	100.7
1989	6 058	13 601	2 412	104.1	98.6	100.2
1990	5 895	13 651	2 392	101.3	98.9	99.4
1991	5 745	13 193	2 333	98.7	95.6	96.9
1992	5 819	13 800	2 407	100.0	100.0	100.0
1993	5 810	13 907	2 301	99.8	100.8	95.6
1994	5 460	13 598	2 197	93.8	98.5	91.3
1995	5 155	13 222	2 124	88.6	95.8	88.2
1996	5 311	13 547	2 134	91.3	98.2	88.7
1997	5 395	13 822	2 187	92.7	100.2	90.9
1998	5 815	14 604	2 224	99.9	105.8	92.4
1999	5 737	14 411	2 145	98.6	104.4	89.1
2000 (p)	5 680	14 390	2 094	97.6	104.3	87.0
Germany						
1990	7 479	20 034	3 195	110.8	120.1	106.9
1991	6 725	16 323	2 917	99.6	97.9	97.6
1992	6 753	16 675	2 989	100.0	100.0	100.0
1993	6 649	16 528	2 808	98.5	99.1	93.9
1994	6 152	15 851	2 613	91.1	95.1	87.4
1995	5 804	15 326	2 529	85.9	91.9	84.6
1996	6 020	15 642	2 547	89.1	93.8	85.2
1997	6 148	15 962	2 614	91.0	95.7	87.5
1998	6 574	16 990	2 656	97.3	101.9	88.9
1999	6 518	16 837	2 582	96.5	101.0	86.4
2000 (p)	6 468	16 719	2 526	95.8	100.3	84.5

p: preliminary
Source: BML, SBA

5 Conclusion

Since regional demand and supply of piglets is not in equilibrium in Germany, piglet prices are determined not only by local markets but also by conditions of other regions. An improved transparency of prices can be achieved by internet stock exchange for piglets. However, the interregional transport of the animals is a problem in regard to intentions to reduce epidemic risks and to secure product quality. The impact of epidemic diseases on regional piglet supply has become obvious by the foot and mouth disease and bans on piglet transport in spring 2001 (Weiß, 2001). Concerning the surpluses of organic fertilizers the intensive livestock regions have problems to improve their provision with piglets only by expanding the population of breeding sows.

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