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# Livestock manure – annual production in the Federal Republic of Germany

Almost 60 % of revenues in German agriculture are generated in animal production. The large amounts of manure originating from this are used as fertilizer either directly or after fermentation in biogas plants. The reported quantities of annual production of manure in Germany differ widely because there is only little information available on the regional distribution of different housing systems. Since 1992, KTBL calculates the amount of slurry, farmyard and liquid manure from cattle and pig production based on best available data concerning number of livestock units and distribution of housing systems.

## Keywords

Livestock manure, manure production, livestock, slurry, farmyard manure

## Abstract

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■ The annual livestock census results [3], as well as countrywide data on management and housing systems collected in the federal states in 1996, represent the basis for KTBL calculations on manure production [1; 2], with annual manure output from cattle and pigs based on average amount excreted per animal [4].

## Total manure production

According to the livestock census results in recent years, the cattle population is decreasing overall whilst that of pigs is increasing [5]. Thus, between 1995 and 2009 cattle numbers reduced by approx. 19 % whilst those of pigs increased by around 12 %.

In 2009 the country had around 13 million head of cattle and 27 m pigs which put the proportion of cattle based on large animal units at approx. 30% and that for pigs at about 63%. In 2009 this population produced a total 152 million tonnes of livestock manure. The amount of slurry produced was calculated at 111 m t fresh mass (FM), production of farmyard manure was put at around 32 m t FM and of liquid manure approx. 10 m t FM.

**Table 1** indicates manure production from 1994 to 2009.

In total, manure produced in the last years has decreased whereby a reduction is especially apparent in the cattle sector. Regarding types of manure, the proportion of farmyard manure in cattle production has remained at the same level since 2005 whereas slurry production has decreased by approx. 5% in that

period. A slight decrease in farmyard manure output from pig production is apparent whereas slurry has increased to a small extent. The changes in livestock populations in the last years are thus mirrored in the composition of the manure produced.

## Slurry and farmyard manure according to federal state

The highest amount of slurry, with approx. 30 m t FM per year, is produced in Bayern with cattle being more responsible (**table 2**). In Niedersachsen around 26 m t FM/y slurry are produced with equal amounts from cattle and pig production. Compared with this, the approx. 19 m t FM/y of slurry produced in Nordrhein-Westfalen comprises around 12.8 m t FM/y from pigs. Two-thirds of total slurry manure produced in Germany comes from these three states.

Of the total farmyard manure produced in Germany (approx. 32 m t FM in 2009) the largest proportion (24 m t FM/y) comes from cattle production. Farmyard manure production in Bayern runs at around 8.5 m t FM/y, followed by Baden-Württemberg with 4.5 m t FM/y and Nordrhein-Westfalen with 3.6 m t FM/y and, with that, more than 50 % of the farmyard manure is produced by these three states.

The proportion of Bayern of all manure produced from cattle and pigs in Germany is around 27 % (**figure 1**). Niedersachsen contributes with around 19 %, Nordrhein-Westfalen with approx. 15 % and Baden-Württemberg with approx. 9 %. This means that around 70 % of all manure produced in Germany comes from these four states.

## Conclusions

Representing almost 60% of total sales income within German agriculture, livestock production is responsible for a high proportion of the sector's earnings [6]. The country's livestock

Table 1

Manure production [Mio. t FM/y] in housing systems for cattle and pig in Germany between 1994 and 2009

Year	Slurry	Farmyard manure (average amount of bedding material 4,5 kg/LU)	Liquid manure/urine (average amount of bedding material 4,5 kg/LU)	Total production
1994	159.3	44.5	13.6	217.4
1995	156.0	44.1	13.4	213.5
1996	156.0	44.3	13.5	213.8
1997	155.6	43.9	13.3	212.8
1998	154.3	43.0	13.2	210.4
1999	151.9	42.1	12.9	206.9
2000	151.9	42.0	12.9	206.8
2001	150.8	41.3	12.7	204.8
2002	148.1	40.5	12.5	201.1
2003	146.9	39.7	12.3	198.9
2004	143.1	38.8	12.0	193.9
2005 <sup>1)</sup>	144.4	38.9	12.0	195.4
2005 <sup>1)</sup>	113.2	32.9	9.9	156.1
2006	112.3	32.2	9.8	154.2
2007	112.4	32.2	9.8	154.4
2008	113.2	32.6	9.8	155.6
2009	110.8	31.8	9.6	152.2

FM = Fresh matter, LU = Livestock unit

<sup>1)</sup> In 2005 the LU code was revised, therefore data are shown employing the old and the new LU code.

manure production contains over 1 m t of nitrogen [7] which, whilst representing a high nutrient potential, could also entail a significant burden on the environment when not properly applied. With the background of legislation towards increased utilisation of organic by-products, particularly in agriculture, as precise as possible information on the actual amounts of manure being produced is required. In turn this could make it easier to estimate future capacities within the agricultural sector for utilising by-products from outside farming. To define more precisely the amounts of manure produced in the sector it will be necessary to include data on current livestock management systems, including grazing where applicable, among the information collected in the official livestock censuses.

## Literature

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Fig. 1

Bavaria is the Federal State with the highest manure production in Germany

Table 2

Manure production [Mio t FM/y] in housing systems for cattle and pig in the Federal States of Germany

Federal State	Slurry			Farmyard manure			Liquid manure		
	Cattle	Pig	Total	Cattle	Pig	Total	Cattle	Pig	Total
	With 10 % DM	With 5 % DM		Average amount of bedding material (4,5 kg/LU)			Average amount of bedding material (4,5 kg/LU)		
Baden-Württemberg	4.6	3.6	8.2	3.7	0.8	4.5	1.0	0.3	1.3
Bayern	24.5	5.6	30.1	6.7	1.6	8.4	1.8	0.7	2.5
Berlin	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Brandenburg	2.1	1.2	3.3	2.0	0.4	2.4	0.5	0.2	0.7
Bremen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hamburg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hessen	2.3	1.1	3.4	0.9	0.3	1.2	0.2	0.1	0.4
Meckl.-Vorpommern	1.9	1.5	3.4	0.5	0.2	0.7	0.1	0.1	0.2
Niedersachsen	13.1	12.9	26.1	1.3	1.0	2.3	0.3	0.4	0.8
Nordrh.-Westfalen	5.8	12.8	18.7	2.0	1.6	3.6	0.5	0.7	1.2
Rheinland-Pfalz	2.0	0.3	2.4	0.8	0.1	1.0	0.2	0.1	0.3
Saarland	0.3	0.0	0.3	0.2	0.0	0.2	0.0	0.0	0.1
Sachsen	1.7	1.3	2.9	1.4	0.2	1.6	0.4	0.1	0.5
Sachsen-Anhalt	1.3	1.3	2.6	2.1	0.6	2.7	0.6	0.2	0.8
Schleswig-Holstein	4.6	2.9	7.5	1.5	0.3	1.8	0.4	0.1	0.5
Thüringen	0.9	1.0	1.9	1.1	0.3	1.4	0.3	0.1	0.4
Deutschland	65.2	45.6	110.8	24.2	7.6	31.8	6.5	3.1	9.6

FM = Fresh matter, DM = Dry matter, LU = Livestock unit