

Germanwatch analysis of chicken meat for antibiotic resistant pathogens

More than every second meat sample contaminated with antimicrobial resistances – including Colistin resistance

Germanwatch investigation, 16 April 2019

Cheap broilers from discounters are 56 percent contaminated with germs that are resistant to antibiotics. More than one in three chickens are contaminated with germs that have resistance to antibiotics with highest priority for humans. This was the result of a spot sample investigation¹ on behalf of Germanwatch, in which a total of 59 chicken meat samples from industrial meat production with the codes for housing 1 and 2² were examined for resistant pathogens. Antibiotics with highest priority for humans such as Colistin are used in humans as a last resort against infectious diseases when other antibiotics no longer work. Often such resistances can be disseminated across species to humans and animals.

Reinhild Benning, agricultural expert of the environmental and consumer organization Germanwatch: "In the fight against antimicrobial resistance from factory farming, Agriculture Minister Julia Klöckner has failed. This is shown by the persistently high resistance rates of the pathogens in chicken meat." Minister Klöckner allows that multidrug-resistant bacteria, ESBL³-producing bacteria and Colistin-resistant pathogens on cheap meat can reach the kitchens of consumers, restaurants, and hospitals. "The antimicrobial resistance will only decrease if the federal government bans critically important antibiotics with highest priority for humans in animal factories. The government has to make all veterinary antibiotics so expensive that they are no longer prescribed to compensate for the consequences of catastrophic housing conditions and turbo breeding in cheap meat and milk production," Benning said.

Of the test purchases, 20 percent of chickens had multiple resistance to three different antibiotic classes simultaneously (3MRGN)⁴, six meat samples carrying MRSA⁵ (10 percent) and three chicken ESBL-producing bacteria (5 percent). High resistance rates of 49-66 percent on chicken meat are also demonstrated by anonymous state monitorings by the Federal Office of Consumer Protection and Food Safety (BVL)⁶.

¹ A spot sample is a common sampling method used in scientific contexts or quality control to obtain partial quantity information on the nature of the total quantity.

² Supermarket companies in Germany have gradually introduced private labeling rules for meat. Level 1 corresponds to the German legal standard. Level 2 is insignificantly above the German legal standard. 3 provides more space per animal, and 4 comprises better animal husbandry and organic meat production. Consumer protection NGOs criticize the labeling in particular, because level 2 does not bring any significant improvement for the animals in the barn, but this is suggested by the delimitation to level 1. Since April 1st 2019, the largest German supermarket chains and their discounters have been using a uniform numbering system of 1-4 to indicate the keeping conditions of slaughter animals. See www.vzbv.de/pres-semiteilung/zuuegig-ambitioniertes-staatliches-tierwohllabel-den-start-bringen

³ Extended-spectrum beta-lactamases (ESBL) are bacterial enzymes that can turn off various antibiotics. In particular, bacteria from the family of enterobacteria can produce these enzymes and become resistant to various antibiotics.

⁴ Multidrug-resistant gram-negative bacteria (MRGN refers to gram-negative rod bacteria that are highly resistant to various antibiotics.) The prefixed number (2, 3, or 4) indicates the number of antibiotic classes that the particular bacterium is resistant to.

⁵ Methicillin-resistant Staphylococcus aureus (MRSA) is a resistant species of staphylococcus. The bacteria settle, for example, in the nasal mucosa, throat and armpit. If these bacteria e.g. enter the body through wounds, they can cause infections.

⁶ www.bvl.bund.de/SharedDocs/Downloads/01_Lebensmittel/04_Zoonosen_Monitoring/Zoonosen_Monitoring_Bericht_2017.pdf?__blob=publicationFile&v=2, p. 31, p. 39

Despite these alarmingly high levels of contamination with chicken meat, the German Federal Government has not taken efficient measures to combat resistance. The new EU Veterinary Regulation leaves it to the Member States to impose stricter rules such as the ban on antibiotics with highest priority for humans, a full transparency in antibiotic use in animal husbandry and transparency in veterinary practices with a focus on their antibiotic sales.

None of the "Top 5" of German supermarket groups offered consistently non-contaminated chicken. Penny's meat samples were over 80 percent, and Aldi chicken was 75 percent contaminated. 58 percent of Netto broilers were contaminated. Every third sample from Lidl and Real stores had resistant pathogens.

The selection of samples was carried out the way millions of consumers in Germany go grocery shopping every day: The poultry meat samples originate from the discounters and supermarket groups Edeka, Rewe, Lidl, Aldi and Metro listed in Table 1, which together account for 90 percent of the total food market in Germany⁷.

Table 1: Overview of discounters and contamination rates by resistant pathogen

Investigation on chicken meat from Germany							
GERMANWATCH							
Discounter	Number of samples per Discounter	Carbapenem resistant germs	Colisitin resistance	3MRGN	MRSA	ESBL	Contaminated meat samples in %
Lidl (Schwarz Group)	12	3	0	2	0	2	33
Netto (Edeka)	12	4	1	1	1	0	58
Real (Metro AG)	12	4	0	1	0	0	33
Aldi (Aldi Süd/ Aldi Nord)	12	4	2	1	2	1	75
Penny (Rewe Group)	11*	3	2	6	2	0	82
Total	59	18	5	11	5	3	56

* One sample damaged and not examined.

Source: Institute of Pharmacy Pharmaceutical Microbiology at the University of Greifswald on behalf of Germanwatch e.V.

All chicken meat samples come from the four largest slaughterhouse groups (PHW Group, Sprehe Group, Plukon Germany and Rothkötter Group) for chickens in Germany. In our view, the largest market power slaughterhouses have the greatest responsibility in terms of health risks to consumers and to people in their supply chains, such as slaughterhouse workers, catching troops and employees in fattening businesses.

The examination of chicken meat for antimicrobial resistant pathogens was carried out by the **Institute of Pharmacy Pharmaceutical Microbiology at the University of Greifswald**⁸. If you have any questions about the method, please contact the laboratory directly.

⁷ www.supermarktmacht.de/wp-content/uploads/supmama_WEB_RZ.pdf

⁸ Contact: Prof. Dr. Katharina Schaufler, PhD; Institute of Pharmacy, Pharmaceutical Microbiology, University of Greifswald, Friedrich-Ludwig-Jahn-Str. 17, 17489 Greifswald; Tel: +49-3834-4204869

Table 2: Overview of slaughterhouses and rates of contamination by resistant pathogen

Investigation on chicken meat from Germany								
GERMANWATCH								
Name of the company	Number of samples	Carbapenem resistant germs	Colistin resistance	3MRGN	MRSA	ESBL	Contaminated meat samples in %	Brand names
PHW-Group	32	10	2	2	1	2	53	WIESENHOF, TIP, Frisch vom Hähnchen, Gut Ponholz, Landjunker, Landküche, Meine Metzgerei, Mühlenhof, Anhaltische Geflügelspezialitäten, Burgland, Feine Landküche, Jack's Farm
Sprehe Group	3	1	1	0	0	1	100	Sprehe, Mühlenhof, Gräfendorfer
Plukon Germany	12	4	2	9	0	2	92	Gourmeat, Gut Ponholz, Landjunker, Landmark, Meine Metzgerei, Mühlenhof
Rothkötter-Group	12	3	0	1	2	0	50	Gut Ponholz, Landjunker, Meine Metzgerei

*Multiple findings on one sample possible
Source: Institute of Pharmacy Pharmaceutical Microbiology at the University of Greifswald on behalf of Germanwatch e.V.

Artisanal butchering without resistance to antimicrobials with highest priority for humans

In addition, Germanwatch has made a spot sample with eleven test purchases of farm artisanal butchering from all over Germany. One of the chicken meat samples from non-industrial slaughter was contaminated with MRSA, which corresponds to nine percent of the artisanal butchering samples. The non-industrial meat samples showed no contaminations with resistance to antibiotics with highest priority for humans. The pollution of one sample with MRSA must be reflected. The result of the sample, however, seems to indicate a health benefit for meat from non-industrial farms and butchers compared to 56 per cent of contaminated samples from industrial farming and industrial slaughterhouses. Six of the eleven samples from artisanal butchers came from organic butchers. No antibiotic-resistant germs were found in the organic chicken meat samples.

Antimicrobial resistant bacteria in organic husbandry less common

The results of the representative zoonosis monitoring 2016, published by the Federal Office of Consumer Protection and Food Safety (BVL) today, show that certain antimicrobial resistant bacteria are less frequently detected in organic broiler holdings than in conventional husbandry. One reason for this could be differences in the frequency of treatment of conventional and organic broiler chickens with antibiotics.

(own translation following: Bundesamt für Verbraucherschutz und Lebensmittelsicherheit, BVL 2017)

Consumption of antimicrobials for food producing animals in Germany after halving since 2011 still twice as high as that of EU neighbors

After the halving of antibiotic consumption in livestock since 2011, according to the European Medicines Agency (EMA), in 2016 in Germany an average of 82 milligrams of antibiotics were used per kilogram of food

producing animals⁹. This means that meat and milk production in Germany needs about twice as much antibiotics as in Denmark, Great Britain or Austria. In the chicken and turkey fattening in Germany veterinarians prescribe antibiotics even with increasing frequency according to the state antimicrobial database.¹⁰

"The German government is at the end of its reduction strategy and must now take immediate new measures," said Benning. "It is important to close all loopholes in the recording of antibiotic consumption in hatcheries, feed companies and livestock farms, whose consumption is not yet recorded in the state database." Benning demands specifically: "In the current implementation of the EU Veterinary Medicines Regulation, Minister of Health Jens Spahn, Consumer Protection Minister Julia Klöckner, and Environment Minister Svenja Schulze have the opportunity to prohibit all World Health Organization-designated antibiotics with highest priority for humans in livestock farming. It is necessary to control this ban with a comprehensive animal health database for all livestock, hatcheries and aquaculture."

The use of antibiotics in Germany in hatcheries is currently barely regulated by law. In many cases, resistances – even those against antibiotics with highest priority for humans – already reach the stables of fattening chicken.¹¹ Germanwatch sees the need for new legal rules for hatcheries and also for antibiotics in feed mixtures.

Contradictory information on the amount of antibiotics output

On request of Germanwatch, the responsible BVL answered on 22.2.2012¹² (own translation)

We cannot communicate the amount of the antibiotics output to the (German) fodder companies (in tons and broken down by active substance) in the years 2017 and 2018 or before, as this data is not recorded according to the DIMDI-AMV (recording of antibiotics release volumes). However, we assume that the quantities still mixed by feed businesses are not significant.

The European Medicines Agency EMA reports for the year 2016: "Sales (mg/PCU) of premixes accounted for 40.8% of the overall sales, 11.9% were oral powders and 37.4% were oral solutions, i.e. 90.1% were for group treatment; 9.0% were injectables, 0.6% were intramammary preparations and 0.3% were oral pastes, boluses and intrauterine preparations."

(Sales of veterinary antimicrobial agents in 30 European countries in 2016, EMA 2018¹³)

According to the EMA, more than 40 percent of antimicrobials in Europe are sold for the treatment of whole herds as premixes for medical feed. In Germany, the responsible authority does not know what quantity or which groups of active substances reach feed plants and animal husbandry via this route because the regulation has a gap here. "The uncontrolled intermixing of antimicrobial substances into the feed must be stopped." Benning also claims that heavy metals such as copper and zinc could enter the animals in larger quantities than the EU feed limits allow and thus contribute to cross-resistance, because legal loopholes and coverage gaps allow this in Germany.

⁹ www.ema.europa.eu/en/documents/report/sales-veterinary-antimicrobial-agents-30-european-countries-2016-trends-2010-2016-eighth-esvac_en.pdf, S. 30f.

¹⁰ www.bmel.de/SharedDocs/Downloads/Tier/Tiergesundheit/Tierarzneimittel/Lagebild%20Antibiotika-einsatz%20bei%20Tieren%20Juli%202018.pdf?__blob=publicationFile, p. 9

¹¹ www.nature.com/articles/s41598-018-23962-7, <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0203158>

¹² Via Mail on 22.2.2019 to Germanwatch

¹³ www.ema.europa.eu/en/documents/report/sales-veterinary-antimicrobial-agents-30-european-countries-2016-trends-2010-2016-eighth-esvac_en.pdf, p. 14

State and corporate due diligence

The German Federal Government is also responsible under human rights law. The right to food requires, among other things, that every state party to the UN Social Pact must ensure that food is safe and of sufficient quality. The Federal Government is therefore obliged to ensure that no products that pose a risk to health are put on the market and that all consumers are protected accordingly. At the same time, the right to health is also affected. Germany has a protective obligation to ensure that private actors do not contribute to the spread of multidrug-resistant germs with meat from Germany. Overall, with regard to the right to health, it must be ensured that everything in possible is done in German pharmaceutical law, which also regulates the handling of antibiotics in animal husbandry, to maintain access to effective antibiotics in the future. The use of antibiotics with highest priority for humans in livestock farming is therefore highly problematic and it should be prohibited effectively. It is indeed urgent to check whether meat that has been contaminated with antimicrobial resistant bacteria is tradable on the market or internationally. Exports of contaminated and therefore potentially harmful food products should not take place under the human right to adequate food.

There are three reasons for a fundamental review of the marketability of meat from Germany:

1. The rather high consumption of antimicrobial substances per kilogram of livestock in animal factories in Germany compared to the EU especially promotes the development of antimicrobial resistances;
2. The frequent and sometimes particularly dangerous resistances to meat from animal factories from Germany should not be disseminated;
3. High German meat and breeding animal exports contribute to the spread of antimicrobial resistance in other countries.

These aspects require significantly more political reform will for a shift to sustainable animal husbandry. According to Germanwatch, meat exports from Germany should be tested by the authorities for antibiotic-resistant germs in order to prevent the spread of dangerous resistance to other countries, such as chicken meat exports to Africa and neighboring EU countries. Surveys show that animals in alternative settings such as virgin soil or organic farming and artisanal butchers have significantly lower levels of stress.¹⁴

Contaminated meat is transported from slaughterhouses in Germany to our kitchens. On the other hand, mathematically, meat companies export 18 percent of the chicken meat produced in Germany.¹⁵ In 2017, 990,700 tons of chicken meat was exported. In 2018, according to preliminary figures, 988,600 tons were exported.¹⁶ Of these, the vast majority goes to EU neighboring countries. Antimicrobial resistance knows no borders and can spread to export destination countries with meat exports. Resistances e.g. against Colistin are particularly dangerous, because the resistance genes can be transferred particularly quickly to other types of bacteria in humans and animals. German government studies found that chicken in the barn had resistance rates of 8.4 percent for Colistin and 4.3 percent for meat in the retail trade¹⁷, while the present study found Colistin-resistant (e. coli) bacteria in 8.5 percent of chicken meat tests from dis-counters.

¹⁴ www.bvl.bund.de/DE/08_PresseInfothek/01_FuerJournalisten_Presse/01_Pressemitteilungen/01_Lebensmittel/2017/2017_11_28_HI_Zoonosen_Jahrespressekonferenz_2017.html and www.rki.de/DE/Content/Infekt/Antibiotikaresistenz/LA_MRSA_und_ESBL.html

¹⁵ Own calculation by Germanwatch according to Agrarexporte 2017 (BMEL 2017)

¹⁶ BMEL 2017; Between 2013 and 2015, poultry meat from Germany was exported for a total of 935.5 million euros. Of this, 10.3% of the product went to third countries; 6.4% in so-called developing countries and 1.6% in Least Developed Countries (LDCs) (Agrarexporte 2017: p. 22).

¹⁷ www.bvl.bund.de/SharedDocs/Downloads/01_Lebensmittel/04_Zoonosen_Monitoring/Zoonosen_Monitoring_Bericht_2016.pdf?__blob=publicationFile&v=4, S. 61

The spread of resistant germs with slaughterhouse wastewater must also be recorded and specifically prevented by nationwide monitoring. The costs of these measures must be borne by the meat exporters or slaughterhouses in accordance with the 'polluter pays' principle.

Labeling must enable consumers to support farm animal husbandry

With the measures established so far to combat resistance from factory farming, the goal was not achieved. Germanwatch therefore calls for a levy on veterinary antibiotics. Reinhold Benning: "If antibiotics become more expensive than animal welfare measures in the future, then the basis is withdrawn from antibiotic abuse. Secondly, in order for farmers to be able to finance their exit from systemic animal suffering, the federal government has to issue a legal obligation to label the form of keeping on animal foodstuffs based on the example of egg labeling. Only a legal regulation can offer farms long-term investment security for animal-friendly stables and consumers a reliable freedom of choice."

Raising prices for antibiotics to a high level by the state, in order to stop the misuse of cheap medicines in industrial livestock farming is an important priority in the fight against resistant germs.

"Antibiotics are very cheap means of production to avoid expensive hygienic and health-promoting measures. The intensification of livestock farming would not have been possible without the drastic increase in the use of antibiotics. Ultimately, however, we can only speculate about the current situation, because a nationwide monitoring has so far failed because of the opposition of the agricultural lobby."

Albert Sundrum, Head of Animal Nutrition and Animal Health, Veterinarian at the University of Kassel, 2019¹⁸ (own translation)

Germanwatch urgently calls for antibiotics with highest priority for humans to be secured for sick people in accordance with the UN Health Organization and for these active substances to be stopped at all levels of factory farming – including hatcheries and breeding animal husbandry – as the Federal Council in Germany has already discussed¹⁹.

Resistance to antibiotics with highest priority for humans

In 31 percent of the chicken meat samples, we found germs that showed resistance to carbapenems. Carbapenems are not approved for livestock, but to be reserved for human medicine. The types of germs²⁰ in which we found carbapenem resistance in our samples are classified as less pathogenic than classic hospital germs. However, the resistance genes often lie on smallest mobile gene segments (on plasmids) and, like the resistance gene against Colistin, can be rapidly transferred from one bacterial species to another.²¹

Mobile gene segments can also be transmitted to more dangerous pathogens. This would also transfer the ability to switch off antibiotics that are particularly important for humans. Whether this is the case for the species found here is not known. According to previous findings, the carbapenem-resistant patho-

¹⁸ ZDF-Interview: „Einsatz wichtiger Antibiotika angestiegen“ from 07.04.2019; www.zdf.de/nachrichten/heute/tiermast-einsatz-wichtiger-antibiotika-sogar-angestiegen-100.html

¹⁹ [www.bundesrat.de/SharedDocs/drucksachen/2017/0701-0800/759-17\(B\).pdf?__blob=publicationFile&v=1](http://www.bundesrat.de/SharedDocs/drucksachen/2017/0701-0800/759-17(B).pdf?__blob=publicationFile&v=1)

²⁰ These are the species: *Achromobacter xylosoxidans*, *Aeromonas sobri*, *Aeromonas hydrophila*, *Aeromonas caviaecaviae*, *Serratia fonticola*

²¹ https://academic.oup.com/ofid/article/4/suppl_1/S131/4295691, www.bfr.bund.de/cm/343/antibiotikaresistenz-carbapenemase-bildende-keime-in-nutztierbestaenden.pdf

gens found in this sample are not inherently resistant, but they have acquired the resistance to carbapenem.²² Germanwatch recommends that state investigations include a broader spectrum of germ species than before. There is an urgent need for research here. Why germs on chicken meat have resistance to banned antibiotics needs to be clarified by intensive research. A high overall use of antibiotics apparently favors the formation of resistance to carbapenems (BfR 2016²³). With this random sample, Germanwatch points to maladministration. More representative studies on preventive consumer protection are the task and duty of public authorities.^{24,25}

EU Food Safety Authority calls for more control over chickens – so far in vain

Already in 2013, the EU Food Safety Authority EFSA demanded that there should be regular state reviews to at least keep an eye on the spread of germs with a dangerous resistance to carbapenems. Fattening chickens, turkeys, pigs for fattening, calves and their meat would have to be given priority in the review, EFSA scientists recommended.²⁶ In fact, fattening pigs and calves are regularly examined throughout the EU. In 2017, Germany was the only country to report a finding in pigs. The RESET research group is researching resistance to antibiotics in a group of intestinal bacteria (enterobacteria²⁷). According to the investigations, a high antibiotic use overall favors the particularly dangerous antibiotic resistance, the carbapenem resistance.

"The RESET project partners of the BfR had examined faeces and environmental samples from agricultural holdings with very sensitive procedures for the presence of ESBL-forming germs. In the further characterization at BfR, some of these germs showed a reduced sensitivity in the resistance testing against carbapenems. Under selection pressure, a greater resistance was observed, meaning that in therapy, these germs would be insensitive to the carbapenems used." (BfR 2016)²⁸

The Germanwatch study also found five chicken meat samples with Colistin-resistant Escherichia coli bacteria. According to the Federal Office for Risk Assessment, the antibiotic Colistin is mainly used in veterinary medicine for the treatment of infections, mostly intestinal diseases.²⁹ Since 2015, it has been scientifically known that germs can pass on Colistin resistance to other bacteria via so-called plasmids without multiplying. This form of spreading via plasmids is also assumed for carbapenem-resistant bacteria.³⁰

The Federal Agency for Risk Assessment writes about the antibiotic with highest priority for humans Colistin: "Its importance for human medicine lies in the treatment of severe infections with Gram-negative bacteria, which are resistant to most commonly used antibiotics including carbapenems. This scientific

²² www.ncbi.nlm.nih.gov/pmc/articles/PMC3264277/

²³ <https://mobil.bfr.bund.de/cm/343/antibiotikaresistenz-carbapenemase-bildende-keime-in-nutztierbestaenden.pdf>

²⁴ www.bundesrechnungshof.de/de/veroeffentlichungen/produkte/gutachten-berichte-bwv/gutachten-bwv-schriftenreihe/langfassungen/bwv-band-16-organisation-des-gesundheitlichen-verbraucherschutzes-schwerpunkt-lebensmittel

²⁵ In 2016, the BfR referred to the EFSA proposals: "The European Food Safety Authority (EFSA) has currently made recommendations for this. It proposes among other things to strengthen the monitoring of livestock and foodstuffs for the presence of carbapenemase-producing bacteria and to establish suitable methods for this purpose. In addition, action plans should be developed to reduce the spread of these bacteria." (www.efsa.europa.eu/en/efsajour-nal/pub/3501.htm)

²⁶ European Food Safety Authority, 2013: Scientific Opinion on Carbapenem resistance in food animal ecosystems EFSA Panel on Biological Hazards (BIOHAZ)

²⁷ Enterobacteria refer to a family of bacteria that are in the digestive tract and partly non-pathogenic (belonging to the normal intestinal flora), partly pathogenic.

²⁸ www.bfr.bund.de/cm/343/antibiotikaresistenz-carbapenemase-bildende-keime-in-nutztierbestaenden.pdf

²⁹ www.bfr.bund.de/de/fragen_und_antworten_zum_antibiotikum_colistin_und_zur_uebertragbaren_colistin_resistenz_von_bakterien-196989.html

³⁰ <https://mobil.bfr.bund.de/cm/343/antibiotikaresistenz-carbapenemase-bildende-keime-in-nutztierbestaenden.pdf>

knowledge has led to public debate on both the use of the antibiotic in livestock farming and the spread of resistance to Colistin. "(BfR 2018³¹)

From 2016 to 2017, the consumption of Colistin among veterinarians in Germany increased from 69 to 74 tons (BVL 2018³²). The European Medicines Agency (EMA) recommends reserving Colistin only for humans. However, so far the Federal Government has not imposed more stringent conditions on Colistin, as it has done since March 2018, than on other medicines that the World Health Organization (WHO) places on the same high level as Colistin, because they have the highest priority as a "last resort" for human medicine.

According to the WHO, around 700,000 people worldwide die each year as a result of antibiotic resistance³³; according to the Robert Koch Institute, up to 2,400 people die in Germany every year³⁴ because antibiotics are no longer effective³⁵. The EU Agency for Disease Control, ECDC, reported in 2018 that since 2007, the number of infections by resistant bacteria has increased significantly. In 2015, more than 670,000 resistant bacteria were counted in Europe, 33,000 people died as a result of infections with antibiotic-resistant pathogens, of which around two-thirds were assigned to the healthcare sector.³⁶ Food is certainly considered as a transmission route for antibiotic resistance, but it is not known to what extent.

"Resistant bacteria can spread through different pathways. If antibiotic resistance occurs in zoonotic bacteria found in animals and food, it may also interfere with the effective treatment of infectious diseases in humans. Food safety policy makers are tasked with protecting consumers from food chain-related risks and setting out the best possible control measures to mitigate such risks." (European Food Safety Authority, EFSA 2019³⁷)

Is not it enough for consumers to work more hygienically?

Of course, hygienic processing of foods helps to reduce the risk of contamination for consumers. However, the European Food Safety Authority (EFSA) warns against restricting the fight against drug resistance because it does not address the root causes of the problem of antibiotic resistance and its spread. A further development and spread of resistant germs from animal husbandry cannot be prevented by better kitchen hygiene alone.

With the present study Germanwatch wants to contribute to a much more effective fight against the spread of antibiotic-resistant pathogens from animal husbandry. The current priority is to preserve the so-called reserve antibiotics with the highest priority for humans, primarily for human medicine.

³¹ www.bfr.bund.de/cm/343/fragen-und-antworten-zum-antibiotikum-colistin-und-zur-uebertragbaren-colistin-resistenz-von-bakterien.pdf

³² www.bvl.bund.de/DE/08_PresseInfothek/01_FuerJournalisten_Presse/01_Pressemitteilungen/05_Tierarzneimittel/2018/2018_07_23_pi_Antibiotikaabgabemenge2017.html

³³ www.euro.who.int/de/countries/romania/news/news/2019/3/romanian-eu-presidency-aims-to-strengthen-europes-one-health-approach-to-fighting-antimicrobial-resistance

³⁴ Gastmeier et al: Nosokomiale Infektionen und Infektionen mit multiresistenten Erregern - Häufigkeit und Sterblichkeit, DMW 2016; 141: 421-426

³⁵ By comparison, in the year 2018, according to the Federal Statistical Office (destatis), 3265 people died in road traffic accidents in Germany www.destatis.de/DE/Presse/Pressemitteilungen/2019/02/PD19_069_46241.html

³⁶ Cassini et al 2019: Attributable deaths and disability-adjusted life-years caused by infections with antibiotic-resistant bacteria in the EU and the European Economic Area in 2015: a population-level modelling analysis, [http://dx.doi.org/10.1016/S1473-3099\(18\)30605-4](http://dx.doi.org/10.1016/S1473-3099(18)30605-4)

³⁷ Information-Website of the EFSA: www.efsa.europa.eu/de/topics/topic/antimicrobial-resistance, retrieved on 14.3.2019

Table 3: Germanwatch chicken test purchases by retail, tradename, slaughterhouse and resistant pathogen

No	City	Retail	Product	Tradename	Identification	Species	Resistant pathogen
1	Berlin	Aldi	Hähnchenunterschenkel (mit Haut)	Gut Ponholz	DE EZG 255 EG		
		Kanalstraße 8, 12357 Berlin			Plukon	Achromobacter xylosoxidans	Carbapenem
2	Berlin	Lidl	Hähnchenflügel	Landjunker	DE NI 11021 EG		
		Semmelweisstraße 106, 12524 Berlin			Rothkötter		
3	Berlin	Penny	Hähnchenunterschenkel	Mühlenhof	DE HE 30104 EG	Escherichia coli	3MRGN
		Eisenhutweg 93, 12487 Berlin				Staphylococcus aureus	MRSA
					Plukon	Achromobacter xylosoxidans	Carbapenem
4	Berlin	Netto	Frisches Hähncheninnenfilet (ohne Haut)	Meine Metzgerei	DE EZG 251 EG		
		Stubenrandstraße 98, 12357 Berlin			Wiesenhof Geflügel-Gruppe (PHW-Gruppe)		
5	Berlin	Real	Deutsches Brathähnchen, Hähnchen ganz (gefroren)	TIP, verbunden mit Wiesenhof	DE ST 00257 EG		
		Chausseestraße 1, 15745 Wildau			Wiesenhof Geflügel-Gruppe (PHW-Gruppe)		
6	Dresden	Aldi	Hähnchenschenkel mit Rückenstück (mit Haut)	Meine Metzgerei	DE EZG 251 EG	Achromobacter xylosoxidans	Carbapenem
		Kesseldorfer Straße 158, 01168 Dresden			Wiesenhof Geflügel-Gruppe (PHW-Gruppe)	Staphylococcus aureus	MRSA
7	Dresden	Lidl	Hähnchenflügel	Landjunker	DE NI 11021 EG		
		Omsewitzer Ring 45, 01168 Dresden			Rothkötter		

8	Dresden	Penny	Hähnchenunterschenkel	Mühlenhof	NW 40102 EG	Aeromonas sobria	Carbapenem
		Merianplatz 3, 01169 Dresden			Sprehe		
9	Dresden	Netto	Hähnchenbrustfilet, Teilstück	Wiesenhof	DE EZG 251 EG	Serratia fonticola	Carbapenem
		Tharandter Straße 65, 01159 Dresden			Wiesenhof Geflügel-Gruppe (PHW-Gruppe)		
10	Dresden	Real	Hähnchen Oberschenkel, mit Haut	Frisch vom Hähnchen	DE NI 31613 EG		
		An der Zschauke 4, 01728 Bannewitz			Wiesenhof Geflügel-Gruppe (PHW-Gruppe)	Aeromonas sobria	Carbapenem
11	Leipzig	Aldi	Frische Hähnchenminutenschnitzel	Meine Metzgerei	DE EZG 251 EG		
		Arthur-Hoffmann-Straße 113, 04275 Leipzig			Wiesenhof Geflügel-Gruppe (PHW-Gruppe)	Aeromonas sobria	Carbapenem
12	Leipzig	Lidl	Hähnchen Ministeaks	Landjunker	DE EZG 255 EG	Aeromonas sobria	Carbapenem
		Zwickauer Straße 66, 04277 Leipzig			Plukon	Escherichia coli	3MRGN
13	Leipzig	Penny	Hähnchen (gefroren)	Landmark	DE MV 12002 EG	Escherichia coli	3MRGN
		Zwickauer Straße 125, 04279 Leipzig			Plukon	Escherichia coli	3MRGN
14	Leipzig	Netto	Premium Broiler (gefroren)	Gräfendorfer	DE ESG 253 EG	Staphylococcus aureus	MRSA
		Bornaische Straße 22, 04277 Leipzig			Sprehe		
15	Leipzig	Real	Fleischhähnchen (gefroren)	Wiesenhof	DE NI 11101 EG, DE ST 00257 EG		
		Milititzer Straße 13, 04178 Leipzig			Wiesenhof Geflügel-Gruppe (PHW-Gruppe)		
16	Erfurt	Aldi	Hähnchenschenkel mit Rückenstück	Meine Metzgerei	DE EZG 251 EG		

		Berliner Platz 4, 99091 Erfurt			Wiesenhof Geflügel-Gruppe (PHW-Gruppe)	Staphylococcus aureus	MRSA
17	Erfurt	Lidl	Hähnchenbrustfilet Teilstück	Landjunker	DE EZG 255 EG	Escherichia coli	3MRGN
		Grenzweg 10, 99091 Erfurt			Plukon		
18	Erfurt	Penny	Hähnchenunterschenkel	Mühlenhof	DE NW 40102 EG		
		Stauffenbergallee 13, 99086 Erfurt			Sprehe	Escherichia coli	Colistin
19	Erfurt	Netto	Brustfilet Teilstück	Gut Ponholz	DE HE 30104 EG	Aeromonas sobria	Carbapenem
		Moskauer Platz 20, 99091 Erfurt			Plukon	Escherichia coli	Colistin
20	Erfurt	Real	Goldbroiler	Anhaltische Geflügelspezialitäten	DE ST 00257 EG		
		Gothaer Straße 22, 00904 Erfurt			Wiesenhof Geflügel-Gruppe (PHW-Gruppe)		
21	Göttingen	Aldi	Deutsches Brathähnchen (gefroren)	Jack's Farm	DE ST 00257 EG		
		Am Kauf Park 2, 37079 Göttingen			Wiesenhof Geflügel-Gruppe (PHW-Gruppe)	Aeromonas sobria	Carbapenem
22	Göttingen	Lidl	Hähnchen-Oberkeulensteaks	Landjunker	DE NI 11101 EG	Escherichia coli	ESBL
		Industriestraße 4a, 37079 Göttingen			Wiesenhof Geflügel-Gruppe (PHW-Gruppe)	Aeromonas hydrophila/caviae	Carbapenem
23	Göttingen	Penny	Hähnchenkeulen	Burgland	DE EZG 251 EG		
		Maschmühlenweg 64, 37081 Göttingen			Wiesenhof Geflügel-Gruppe (PHW-Gruppe)		
24	Göttingen	Netto	Geschnetzeltes aus dem Hähnchenbrustfilet	Gut Ponholz	DE NI 11021 EG	Escherichia coli	3MRGN

		Königsallee 243, 37081 Göttingen			Rothkötter		
25	Göttingen	Real	Hähnchenflügel	Frisch vom Hähnchen	DE NI 31613 EG		
		Am Kauf Park 2, 37079 Göttingen			Wiesenhof Geflügel-Gruppe (PHW-Gruppe)	Aeromonas sobria	Carbapenem
26	Hannover	Aldi	Hähnchenschenkel mit Rückenteil	Meine Metzgerei	DE NI 11101 EG	Escherichia coli	Colistin
		Hildesheimer Straße 401, 30519 Hannover			Wiesenhof Geflügel-Gruppe (PHW-Gruppe)		
27	Hannover	Lidl	Hähnchenflügel	Landjunker	DE NI 11021 EG	Escherichia coli	ESBL
		Wülfeler Straße 78 30539 Hannover			Rothkötter	Aeromonas sobria	Carbapenem
28	Hannover	Penny	Hähnchenbrustfilet	Mühlenhof	DE EZG 251 EG	Aeromonas sobria	Carbapenem
		An der Wollebahn 3, 30519 Hannover			Wiesenhof Geflügel-Gruppe (PHW-Gruppe)		
29	Hannover	Netto	Hähnchenschenkel (gefroren)	Wiesenhof	DE ST 00257 EG		
		Eupener Straße 1, 30519 Hannover			Wiesenhof Geflügel-Gruppe (PHW-Gruppe)		
30	Hannover	Real	Hähnchenschenkel, gefroren	Feine Landküche	DE ST 00257 EG		
		Davenstedter Straße 80, 30453 Hannover			Wiesenhof Geflügel-Gruppe (PHW-Gruppe)		
31	Hamburg	Aldi	Hähnchen Minutenschnitzel	Meine Metzgerei	DE NI 11101 EG	Escherichia coli	3MRGN
		Schiffbeker Weg 27, 22111 Hamburg			Wiesenhof Geflügel-Gruppe (PHW-Gruppe)		
32	Hamburg	Lidl	Hähnchenunterkeule	Landjunker	DE NI 11021 EG		

		Rennbahnstraße 115, 22111 Ham- burg			Rothkötter		
33	Hamburg	Penny	Hähnchenmedaillon	Mühlenhof	DE HE 30104 EG		
		Siebekingsallee 185, 22111 Ham- burg			Plukon	Escherichia coli	3MRGN
34	Hamburg	Netto	Hähnchen Minutenschnit- zel	Gut Ponholz	DE NI 11021 EG	Aeromonas sobria	Carbape- nem
		Möller Landstraße 250, 22117 Ham- burg			Rothkötter		
35	Hamburg	Real	Hähnchenunterschenkel	Frisch vom Hähn- chen	DE NI 31613 EG	Aeromonas sobria	Carbape- nem
		Willinghusener Weg 1, 22113 Ost- steinbek			Wiesenhof Geflü- gel-Gruppe (PHW- Gruppe)	Escherichia coli	3MRGN
36	Köln	Aldi	Deutsches Hähnchen (ge- frozen)	Feine Landküche	DE ST 00257 EG		
		Grüner Weg 2, 50825 Köln			Wiesenhof Geflü- gel-Gruppe (PHW- Gruppe)		
37	Köln	Lidl	Hähnchenoberkeule	Landjunker	DE NI 10021 EG		
		Leyendecker- straße 2a, 50825 Köln			Rothkötter		
38	Köln	Penny	Hähnchen (gefroren)	Landmark	DE MV 12002 EG		
		Ehrenfeldgürtel 95, 50823 Köln			Plukon	Escherichia coli	Colistin
39	Köln	Netto	Brathähnchen (gefroren)	Gourmeat	DE MV 12002 EG	Escherichia coli	3MRGN
		Vogelsanger Straße 202, 50825 Köln			Plukon		
40	Köln	Real	Deutsches Brathähnchen (gefroren)	TIP	DE ST 00257 EG		
		Weißhausstraße 20-30, 50939 Köln			Wiesenhof Geflü- gel-Gruppe (PHW- Gruppe)		

41	Stuttgart	Aldi	Hähnchenunterkeulen	Meine Metzgerei	DE NI 10021 EG	Escherichia coli	ESBL
		Senefelderstraße 12/1, 73760 Ostfildern			Rothkötter		
42	Stuttgart	Lidl	Hähnchenunterkeulen	Landjunker	DE BY 21057 EG		
		Nürtingerstraße 87, 70794 Filderstadt			Wiesenhof Geflügel-Gruppe (PHW-Gruppe)		
43	Stuttgart	Netto	Schenkel mit Rückenstück	Gut Ponholz	DE BY 21057 EG		
		Karlsstraße 94, 70794 Filderstadt			Wiesenhof Geflügel-Gruppe (PHW-Gruppe)		
44	Stuttgart	Real	Hähnchenunterschenkel	Frisch vom Hähnchen	DE NI 31613 EG		
		Plieningerstraße 63, 70794 Filderstadt			Wiesenhof Geflügel-Gruppe (PHW-Gruppe)		
45	Nürnberg	Aldi	Hähnchenunterkeule	Meine Metzgerei	DE NI 11021 EG		
		Bessemerstraße 6, 90411 Nürnberg			Rothkötter		
46	Nürnberg	Lidl	Hähncheninnenfilet	Landjunker	DE BY 21057 EG		
		Bessemerstraße 17, 90411 Nürnberg			Wiesenhof Geflügel-Gruppe (PHW-Gruppe)		
47	Nürnberg	Penny	Hähnchen, gefroren	Landmark	DE MV 12002 EG	Escherichia coli	3MRGN
		Rollnerstraße 121, 90408 Nürnberg			Plukon		
48	Nürnberg	Netto	Hähnchenbrustfilet	Wiesenhof	DE BY 21057 EG		
		Äußere Bayreuther Str. 105, 90409 Nürnberg			Wiesenhof Geflügel-Gruppe (PHW-Gruppe)		
49	Nürnberg	Real	Deutsches Brathähnchen (gefroren)	TIP	DE ST 00257 EG		

		Äußere Bayreuther Str. 105, 90409 Nürnberg			Wiesenhof Geflügel-Gruppe (PHW-Gruppe)		
50	Frankfurt	Aldi	Hähncheninnenfilet	Meine Metzgerei	DE NI 11021 EG		
		Ginnheimer Straße 7+9, 65760 Eschborn			Rothkötter		
51	Frankfurt	Lidl	Hähnchenoberkeule	Landjunker	DE NI 11021 EG		
		Ginnheimer Straße 10 65760 Eschborn			Rothkötter		
52	Frankfurt	Penny	Hähnchenschenkel (gefroren)	Landmark	De MV 12002 EG	Staphylococcus aureus	MRSA
		Thudichumstraße 6-8, 60489 Frankfurt/Main			Plukon	Klebsiella pneumoniae	3MRGN
53	Frankfurt	Netto	Schenkel mit Rückenstück	Gut Ponholz	DE NI 11021 EG		
		Westerbachstraße 40, 60489 Frankfurt/Main			Rothkötter	Aeromonas sobria	Carbapenem
54	Frankfurt	Real	Hähnchen Oberschenkel, mit Haut	Frisch vom Hähnchen	DE NI 31613 EG		
		Ginnheimer Straße 18, 65760 Eschborn			Wiesenhof Geflügel-Gruppe (PHW-Gruppe)	Serratia fonticola	Carbapenem
55	Bayern	Penny	Hähnchen (gefroren)	Landmark	DE MV 12002 EG		
		Frontenhausener Straße 32, 84137 Vilsbiburg			Plukon		
56	Bayern	Aldi	Deutsches Hähnchen (gefroren)	Landküche	DE ST 00257 EG	Escherichia coli	Colistin
		Ohmstraße 4, 84137 Vilsbiburg			Wiesenhof Geflügel-Gruppe (PHW-Gruppe)		
57	Bayern	Lidl	Hähnchen Ministeaks	Landjunker	DE BY 21057 EG		

		Fürstenrieder Straße 220, 81377 München	Gekauft am 04.02.19		Wiesenhof Geflü- gel-Gruppe (PHW- Gruppe)		
58	Bayern	Netto	Suppentteile frisch	Gut Ponholz	DE BY 21057 EG		
		Meglinger Straße 6, 81477 München			Wiesenhof Geflü- gel-Gruppe (PHW- Gruppe)		
59	Bayern	Real	Hähnchenflügel	Frisch vom Hähn- chen	DE NI 31613 EG		
		Margot-Kalinke- Straße 4, 80939 München			Wiesenhof Geflü- gel-Gruppe (PHW- Gruppe)		

Table 4: Germanwatch chicken meat test purchases from farm slaughtering by retail and resistant pathogen

No.		Retail	Product and Date of Purchase	Species	Resistant pathogen
1	Hof	Schönberger Geflügel- hof Weber,	Keule vom Maishähnchen, mit Haut (gefroren)		
		Schönberg	Gekauft am 28.01.19		
2	Onl	Bauckhof Klein Süstedt OHG	Hähnchenkeule frisch		
		Uelzen	Ankunft per Versand am 28.01.2019		
3	Hof	Geflügelhof Bleuel	Hähnchenflügel, frisch		
		Hofbieber	Gekauft am 29.01.19		
4	Hof	Geflügelhof Raden	Hähnchenkeule (gefroren)		
		Lalendorf	Gekauft am 30.01.19		
5	Hof	Chiemgauhof Locking	Bio Gockel-Keule		
		Amerang	Gekauft am 30.01.19		
6	Hof	Biogeflügelhof Graf	Hähnchenflügel		
		Steinkirchen	Gekauft am 30.01.19		
7	Hof	Grosserhof Ergolding	Bio-Hähnchenkeulen		
		Ergolding	Gekauft am 30.01.19		

8	Hof	Biolandhof Hohenbrück	Hähnchenbrustfilet		
		Märkische Heide	Gekauft am 02.02.19 (Wochenmarkt)		
9	Hof	Geflügelhof Rehm	Hähnchenkeulen		
		Westerheim	Gekauft am 05.02.19		
10	Hof	Schweine- und Geflügelhof Maier	Hähnchenkeulen	Staphylococcus aureus	MRSA
		Neustetten	Gekauft am 05.02.19		
11	Onl	Brunnenhof	Landgockel Flügel		
		Künzelsau			

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