# BUND-TEST
# „ANTIBIOTIC RESISTANT BACTERIA ON CHICKEN MEAT", GERMANY 2011

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## 1. Antibiotics and intensive livestock farming

Many animals on little space, stress, heat, problems with hygiene – without additional "tools", intensive livestock farming would not be possible. For the system to work, antibiotics are used on a large scale. In 2011, the German federal states North Rhine-Westphalia and Lower Saxony published two studies which showed the extreme extent of the use of antibiotics in intensive livestock farming. The study from North Rhine-Westphalia shows that 96% of the broilers were administered antibiotics. In some cases, as many as eight different agents were used in a very short period of time.[1] According to the study from Lower Saxony, antibiotics were used in 82% of the broiler plants, 77% of the porker plants and 100% of the calf plants. In some turkey plants, the number of doses given amounted to 81 per animal.

The probability that resistant bacteria can emerge and prosper rises with the frequency of the use of antibiotics. The same goes if antibiotics are administered for a shorter period than prescribed or without a previous test of the bacteria that the agents need to target.[2] Further factors are: mass medication, long-term medication, and a prophylactic or metaphylactic use (if single animals are ill, the whole flock is treated)[3]. The studies from the two federal states suggest that these factors are present in intensive livestock farming in Germany.

## 2. What is the problem for public health?

Resistant bacteria very often not only affect animals, but humans, too. In many cases, bacteria have become resistant against antibiotics that are critically important in the treatment of serious infections, limiting therapeutic possibilities. According to the European Parliament, resistant bacteria cause the deaths of 25.000 Europeans per year. The World Health Organisation (WHO) describes the problem as follows: "The widespread use of antimicrobials not only for therapeutic purposes but also for prophylactic and growth promotion purposes in livestock production has intensified the risk for the emergence and spread of resistant microorganisms. This raises particular concern since the same classes of antimicrobials are used both in humans and animals. The emergence and spread of antimicrobial resistance in bacteria poses a threat to human health and presents a major financial burden. Moreover, few new antibiotics are being developed to replace those becoming ineffective through resistance".[4]

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[1] Landesamt für Natur, Umwelt und Verbraucherschutz Nordrhein-Westfalen. Abschlussbericht. Evaluierung des Antibiotikaeinsatzes in der Hähnchenhaltung, Link http://www.umwelt.nrw.de/verbraucherschutz/pdf/antibiotika_masthaehnchen_studie.pdf.

[2] Prof. Dr. Uwe Rösler in a radio programme with the title „Resistente Erreger aus dem Stall – Antibiotika in der Tierhaltung" vom 21.9.2011, Link http://www.swr.de/swr2/programm/sendungen/wissen/archiv/resistenteerreger-aus-dem-stall/-/id=660334/nid=660334/did=8466370/1eb1rcl/index.html.

[3] Focke, Hermann (2010): Die Natur schlägt zurück. Antibiotikamissbrauch in der intensiven Nutztierhaltung und Auswirkungen auf Mensch, Tier und Umwelt. Berlin: Pro Business, S. 101.

[4] World Health Organization (2007): Critically Important Antimicrobials for Human Medicine: Categorization for the Development of Risk Management Strategies to contain Antimicrobial Resistance due to Non-Human Antimicrobial Use, Link: http://www.who.int/foodborne_disease/resistance/antimicrobials_human.pdf.

## 3. What is MRSA?

MRSA stands for „Methicillin resistant Staphylococcus aureus". These are bacteria that colonise the skin and mucous membranes of humans and animals. They can cause wound infections. In humans with a weak immune system, they can cause sepsis and pneumonia. MRSA are resistant against very many antibiotics. Currently, MRSA are known as "hospital bacteria". In hospital, they are passed from patient to patient. However, a transmission from animal to human is possible.[5] According to the German Robert-Koch-Institute, the central federal institution responsible for disease control and prevention, humans who are in close contact with animals (e.g. farmers, veterinarians) have a risk of carrying MRSA that is 138 times higher than for the rest of the population.[6]

Consumers are confronted with MRSA when preparing meat. In 2010, the Robert-Koch-Institute analysed samples from frozen meat and found MRSA in the thaw water of 43% of the turkey samples and 24% of the chicken samples.

Currently, the distinction is made between livestock associated MRSA (la-MRSA) and hospital acquired (ha-MRSA). To date, la-MRSA expresses low virulence. However, German and Dutch scientists[7] expect la-MRSA to become more virulent – and thus a bigger threat to humans – over the next years.

## 4. What is ESBL?

ESBL are certain enzymes, Extended Spectrum Beta-Lactamases. If gut bacteria such as E. coli or Klebsiella can produce these enzymes, they are resistant against beta-lactam antibiotics (e.g. penicillins, cephalosporins) and, frequently, also against fluorchinolons.[8]

Cephalosporins of the third and fourth generation and fluorchinolons are what the WHO calls critically important antimicrobials.[9] If these agents become ineffective, therapeutic possibilities are extremely limited and patients are under threat. The only antibiotics that might help in those cases are carbapenems. Every use of carbapenems, however, increases the likelihood that new resistances develop – and that the prospects for patients darken even further.[10]

According to EFSA, since 2000, "ESBL/AmpC-producing *Salmonella* and *E. coli* in animals and foods have been increasingly reported both in Europe and globally. These resistant bacterial strains have been found in all major food-producing animals, most frequently in live chickens and chicken meat, eggs and other poultry products."[11] According to a Dutch study (2011)[12], there is a genetic overlap between ESBL-producing bacteria found in animals and humans.

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[5] Cuny, Christiane/Layer, Franziska/Witte, Wolfgang: Tier-assoziierte MRSA-Besiedlung und Infektion beim Menschen. Powerpoint-Presentation.
[6] Cuny, Christiane: Übertragung von LA-MRSA CC398 von Schweinen auf Menschen. Powerpoint-Presentation.
[7] Schijffelen, Maarten J: Whole genome analysis of a livestock-associated methicillin-resistant Staphylococcus aureus ST398 isolate from a case of human endocarditis. BMC Genomics 2010, 11:376.
[8] Rösler, Uwe: Multiresistente Infektionserreger in der Abluft und Umgebung von Nutztierhaltung. Powerpoint-Presentation, Datei liegt vor.
[9] Bundesinstitut für Risikobewertung: Wissenschaftliche Bewertung der Ergebnisse des Resistenzmonitorings nach dem Zoonosen-Stichprobenplan 2009. Stellungnahme Nr. 047/2010 des BfR vom 1. November 2010. http://www.bfr.bund.de/cm/343/wissenschaftliche_bewertung_der_ergebnisse_des_resistenzmonitorings_nach_dem_zoonosen_stichprobenplan_2009.pdf.
[10] RESET: FAQs. http://www.reset-verbund.de/faq.htm.
[11] European Food Safety Authority (EFSA): EFSA evaluates the public health risk of bacterial strains resistant to certain antimicrobials in food and food-producing animals. http://www.efsa.europa.eu/en/press/news/110802a.htm, 2.8.2011.
[12] Leverstein-van Hall MA, Dierikx CM, Cohen Stuart J, Voets GM, van den Munckhof MP, van Essen-Zandbergen A, Platteel T, Fluit AC, van de Sande-Bruinsma N, Scharinga J, Bonten MJ and Mevius DJ, 2011. Dutch patients, retail chicken meat and poultry share the same ESBL genes, plasmids and strains. Clin Microbiol Infect, 17, 873-880.

The German Federal Institute for Risk Assessment (BfR) states that bacteria that are present in livestock production and foodstuff of animal origin are one of the main causes of human infections with ESBL-producing bacteria.[13] For consumers, those bacteria are a source of risk, e.g. if colonised meat is not cooked properly or if the same cooking utensils are used for meat and raw produce such as vegetables. Even if they do not cause immediate infections in healthy people, ESBL-producing bacteria can stay in the intestinal tract for a longer period of time. The bacteria can be passed on to other people. In the intestinal tract, the ability to produce ESBL can be passed from one sort of bacteria, e.g. E.coli, to another, e.g. salmonella[14] – extending the reservoir of ESBL-producing bacteria.

If humans with ESBL-producing bacteria in their intestinal tract need to undergo surgery, the bacteria can move deeper into the body. They can cause wound infections, urinary infections and sepsis. Because of the ability of the bacteria to produce ESBL, standard treatments no longer work in such cases. The patients lives are at risk.

EFSA has called to stop the use of cephalosporins of the third and fourth generation in livestock production. In Denmark, France and the Netherlands, pig producers committed themselves to no longer administer these antibiotics.

## 5. Why hygiene in the kitchen is not enough

A hygienic preparation of foodstuff helps to minimise the risk for consumers. EFA warns however that this does not tackle the underlying cause of the problem. Hygiene alone will not stop the further development and spreading of resistant bacteria[15].

## 6. What was the aim of our test?

The aim was to have a first indication for

- the prevalence of ESBL-producing bacteria and MRSA in the German food chain
- the risk for German consumers
- the urgency for political action.

## 7. Design of the test

- The samples came from five different cities/urban regions in Germany (Berlin, Hamburg, Nuremberg, Cologne, Stuttgart region). From each of these cities, four meat samples were sent to a laboratory in Hamburg (-> 20 samples in total).
- We bought fresh, pre-packed meat (not from the counter, but from the shelves). Different chicken parts were bought (e.g. thighs, breast).
- Ten of the samples came from low-cost supermarkets (Netto, Aldi, Lidl), the other half came from "normal" retailers.
- The samples came from the five biggest supermarket chains in Germany: Aldi, the Schwarz-Group (Lidl and Kaufland), Rewe (Rewe and Penny), Edeka (E-Center, Marktkauf, Netto) and Metro (Real).
- The samples came from the leading producers of broiler meat: Wiesenhof, Sprehe, Stolle, Rothkötter

[13] Bundesinstitut für Risikobewertung: Fragen und Antworten zu ESBL-tragenden antibiotikaresistenten Keimen. http://www.bfr.bund.de/de/fragen_und_antworten_zu_esbl_tragenden_antibiotikaresistenten_keimen-106471.html#topic_106564, 28.7.2011.

[14] RESET: FAQs. http://www.reset-verbund.de/faq.htm.

[15] EFSA Panel on Biological Hazards (BIOHAZ) (2011): Scientific Opinion on the public health risks of bacterial strains producing extended-spectrum -lactamases and/or AmpC -lactamases in food and food-producing animals. In: EFSA Journal 2011, 9(8):2322, Link: http://www.efsa.europa.eu/de/efsajournal/doc/2322.pdf.

8. What were the results?

**BUND: Analysis of chicken meat on MRSA and ESBL-producing bacteria – Results (December 2011)**

| *City/supermarket* | *Brand* | *Producer* | *Result* |
|---|---|---|---|
| **Berlin** | | | |
| Edeka | Heidegold | Wiesenhof | ESBL: positive - E.coli; MRSA: negative |
| Edeka | Heidegold | Wiesenhof | ESBL: negative; MRSA: negative |
| Penny | Juwel | Stolle | ESBL: positive - E.coli; MRSA: negative |
| Penny | Juwel | Stolle | ESBL: positive - E.coli; MRSA: negative |
| **Hamburg** | | | |
| Netto | Gut Ponholz | Stolle | ESBL: positive - E.coli; MRSA: negative |
| Netto | Gut Ponholz | Stolle | ESBL: positive - E.coli; MRSA: positve |
| Rewe | Wilhelm Brandenburg | Sprehe | ESBL: negative; MRSA: positive |
| Rewe | Wilhelm Brandenburg | Sprehe | ESBL: negative; MRSA: negative |
| **Köln** | | | |
| Netto | Gut Ponholz | Wiesenhof | ESBL: negative; MRSA: negative |
| Netto | Gut Ponholz | Wiesenhof | ESBL: positive - E.coli; MRSA: negative |
| Rewe | Astenhof | Sprehe | ESBL: positive - E.coli; MRSA: negative |
| Rewe | Astenhof | Sprehe | ESBL: positive - E.coli; MRSA: negative |
| **Nürnberg** | | | |
| Aldi | geka | Wiesenhof | ESBL: negative; MRSA: negative |
| Aldi | geka | Wiesenhof | ESBL: negative; MRSA: negative |
| Edeka | Astenhof | Sprehe | ESBL: positive - E.coli; MRSA: negative |
| Edeka | Astenhof | Sprehe | ESBL: negative; MRSA: negative |
| **Stuttgarter Region** | | | |
| Aldi | Landgeflügel | Rothkötter | ESBL: negative; MRSA: negative |
| Metro | Astenhof | Sprehe | ESBL: negative; MRSA: negative |
| Lidl | Landjunker | Wiesenhof | ESBL: positive - E.coli; MRSA: negative |
| Kaufland | Wiesenhof | Wiesenhof | ESBL: negative; MRSA: negative |

## 9. How does BUND/FOE Germany interpret the results?

- More than half of the samples were colonised by MRSA and/oder ESBL-producing bacteria.
- That means that the possibility that consumers buy chicken with these resistant bacteria is high
- Almost all of the tested supermarket chains were affected, as were the three main producers of chicken meat in Germany.
- The results are not representative. We call for the German government/public authorities to initiate larger, representative studies as it is the task of government/public authorities to protect public health.

## 10. What BUND/FOE Germany calls for

1. Reduction of the use of antibiotics in livestock production, including a proper reduction target
2. Higher legal standards for livestock production, so that the use of antibiotics can be reduced to a minimum
3. No use of important antibiotics in livestock production (e.g. Cephalosporins of the third and fourth generation and fluorchinolons)
4. Strict monitoring and control of the use of antibiotics in livestock production[16]

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[16] Cf. European Medicines Agency (2011): Trends in the sales of veterinary antimicrobial agents in nine European countries. Reporting period: 2005-2009, Link: http://www.ema.europa.eu/docs/en_GB/document_library/Report/2011/09/WC500112309.pdf.