



RESIDUES OF ANTIMICROBIAL DRUGS IN CHICKEN MEAT AND OFFALS

Al. Pavlov, L. Lashev, I. Vachin, V. Rusev

Faculty of Veterinary Medicine, Trakia University, Stara Zagora

ABSTRACT

Studies were carried out on the presence of antimicrobial drugs residues in chicken in edible tissues (breast muscles, liver and kidneys), slaughtered in two abattoirs in Bulgaria. A four-plate agar diffusion test using *Bacillus subtilis* and *Bacillus mycoides* as the test microorganisms was evaluated for the detection of antibiotic availability.

From 75 samples from the first abattoir two positive samples were found, while in the second there were no positive samples from breast muscles. The great number of samples with antimicrobial residues was found in kidneys and livers of the chicken. It was stated that probably in some cases chicken meat producers do not respect regulations about withdrawal periods of the veterinary products.

Key words: antimicrobials, residues, poultry meat, food safety

INTRODUCTION

The presence of xenobiotics, especially antibiotic residues in the foodstuffs of animal origin is one of the most important indexes for their safety. In this connection in the European Union exists strict legislative rules (Anonymous, 1996).

The use of antimicrobials for the treatment or prevention of disease in animals closely followed their uses in humans (Gustafson and Bowen, 1997) and today antimicrobial drugs are used to control, prevent and treat infection, and to enhance animal growth and feed efficiency (Tollefson and Miller, 2000). Treatment of animals reared for food, especially poultry, is generally directed at groups or herds of animals. Currently, approximately 80% of all food-producing animals receive medication for part or most their lives (Lee et al., 2001). This use of antibiotic drugs in food-producing animals may result in the presence of residues in meat and offal. Protection of public health against possible harmful effects of veterinary drug residues is a very important problem.

There are in Bulgarian legislation requirements on that matter. Regulation No. 6/18.03.2002 of the Ministry of agriculture and forestry describes the measures for control of the veterinary drugs residues and environmental polluting agents in live animals

and foods, and in present days Regulation No. 53/28.04.2006 is in force (Anonymous, 2002).

The Veterinary Service perform National monitory program for control of the veterinary drug residues in the foodstuffs of animal origin.

Residues of the antibiotics were quantified in pork and chicken muscle tissue that had previously been screened with a microbiological inhibition test by De Wasch et al. (1998). They used a pH 6 culture medium seeded with *Bacillus subtilis* and results indicate that this inhibition test is well suited to screen pork and chicken muscle tissue for residues of antibiotics.

Many authors carried out investigations of antibiotic residues in poultry meat and products. Samples of market-ready chicken muscle and liver from 32 local broiler farms were screened for antibiotic residues by microbiological assay by Al-Mustafa and Al-Ghamdi et al. (2000). Al-Ghamdi et al. (2000) stated that chicken muscle, liver and egg samples were collected from 33 broiler and 5 layer farms in the eastern province of Saudi Arabia over a period of two years. Antibiotic-residue positive samples were identified in the products of 23 (69.7%) broiler and 3 (60%) layer poultry farms.

The aim of this study was to carry out investigation on the antibiotic-residue positive samples from edible tissues from broiler-

chickens, slaughtered in two Bulgarian abattoirs.

MATERIALS AND METHODS

The samples were collected from the two biggest enterprises – one situated in the Northern part and second – in Southern part of Bulgaria.

For analysis whole carcasses were collected immediately after processing and chilling. Samples from meat (breast muscles), liver and kidneys were taken as follows: meat – 115, liver – 192 and kidneys – 155. Samples were wrapped in polyethylene bags and freeze and stored in minus 18°C up to the analyzing. Total amount of 245 samples from the first and 217 samples from the second enterprise were taken in winter period (November to March) and summer period (May to October). The antimicrobial drug residues were

analyzed by four-plate agar diffusion test using *Bacillus subtilis* and *Bacillus mycoides* as the test microorganisms (C.N.E.V.A. UCM 90/01 method, Anonymous, 2004).

RESULTS AND DISCUSSION

Table 1 shows the results from analyzing of the samples from meat (breast muscles), liver and kidneys from broiler chickens, slaughtered in the abattoir No. 1. The total amount of samples investigated is 75 meat samples and 170 samples of offal. The main result from these investigations was that 2 samples (4%) from meat were identified as antibiotic-residue-positive. Liver and kidney samples positive results were many more than these from meat. A peak of these results was 33% positive samples from kidneys in the winter period.

Positive samples for antimicrobial drugs in chicken meat and offal (Enterprise No. 1)

Season	n	Breast meat	n	Liver	n	Kidney
Winter (November to march)	45	2 (4%)	45	8 (17%)	45	15 (33%)
Summer (May to October)	30	0	40	3 (7,5%)	40	7 (17,5%)

There were substantial differences in the number, respectively in the percent of antibiotic-positive samples in the abattoir No. 2 (data from table 2).

These data shows that from total 40 samples of meat (breast muscles) there were not positive result for antimicrobials, and in offal samples results were considerable lower.

From total 107 liver samples the positive results were determine in 6% and 3% respectively for winter and summer periods. These percents were times lower than results from table 1. The data for 70 kidney samples shows 20 and 11% positive samples. This was higher than liver samples but lower than results for samples from abattoir No. 1.

Positive samples for antimicrobial drugs in chicken meat and offal (Enterprise No. 2)

Season	n	Breast meat	n	Liver	n	Kidney
Winter (November to march)	25	0	62	4 (6,45%)	35	7 (20)
Summer (May to October)	15	0	45	2 (4,4%)	35	4 (11,4%)

It is necessary to make reference that all positive results were with unknown antimicrobial substance, because this method does not allow differentiation of the type of drugs.

The presented results showed that chicken meat producers not always keep in mind withdrawal periods of the veterinary products used in their farms. This is contrary to the requirements of the National Regulations and European Directives.

The results from studies presented were similar to the investigation of may other autors (Al-Mustafa & Al-Ghamdi, 2000; Al-Ghamdi & al., 2000; Rutherford & al., 2000; Atef & al., 1993) for different animals and antimicrobials.

In spite of kidney from broilers are not edible tissue, they usually remain with chicken carcass and can be potential risk for the consumers. A worried signal is the data for presence of antimicrobial residues in 25% of livers (data for summer period). Even we can consider that real concentration of the antimicrobials is relatively low (possibly in the limits or lower of MRL) this can be risk for allergic reaction and antibiotic resistances in man.

REFERENCES

1. Anonymous, Regulation No. 6/18.03.2002 of the Ministry of agriculture and forestry on the measures for control of the veterinary drugs residues and environmental polluting agents in live animals and (State Gazette, No. 32/ 29.03.2002.), 2002.
2. Anonymous, Regulation No. 53/28.04.2006 of the Ministry of agriculture and forestry (State Gazette, No. 45/ 2.06.2006.) 2006.
3. Anonymous, National monitory program for control of the veterinary drugs residues in the foodstuffs of animal origin, (http://www.mzgar.government.bg/nacsujbi/NVMS/DVSK/pdf/NMPK_O_2004_bg.PDF) 2004.
4. Anonymous, European Community. Council Directive 96/23/EC of 29 April 1996 on measures to monitor certain substances and residues thereof in live animals and animal products and repealing Directives 85/358/EEC and 86/469/EEC. Off. J. Eur. Communities. L 125, p. 10. 1996.
5. Al-Ghamdi M. S., Al-Mustafa Z. H., El-Morsy F., Al-Faky A., Haider I., Essa H. Residues of tetracycline compounds in poultry products in the eastern province of Saudi Arabia. *Public Health*, 114, (4):300-304, 2000.
6. Al-Mustafa Z. H., Al-Ghamdi M. S. Use of norfloxacin in poultry production in the eastern province of Saudi Arabia and its possible impact on public health. *Int J Environ Health Res*, 10, (4):291-299, 2000.
7. Rutherford B. S., Gardner R. C., West S. D., Robb C. K., Dolder S. C. Residues of spinosad in meat, milk, and eggs. *J Agric Food Chem*, 48, (9):4428-4431, 2000.
8. Atef M, Hanafy M. S., Abd el-Aziz M. I. Effect of pyridoxine on the distribution of chloramphenicol and its residues in the chicken. *Br Poult Sci*, 34, (1):161-166, 1993.
9. Lee, H. J., Lee, M. H., Ruy, P. D., Public health risks: chemical and antibiotic residues. *Asian-Aust. J. Anim. Sci.* 14, 402-413, 2001.
10. Gustafson, R. H., Bowen, R. E., Antibiotic use in animal agriculture. *J. Appl. Microbiol.*, 83, 531-541, 1997.
11. Tollefson, L. and Miller, M. A. Antibiotic use in food animals: controlling the human health impact. *J. AOAC. Int.*, 83, 245-256, 2000.
12. De Wasch K, Okerman L, Croubels S, De Brabander H, Van Hoof J, De Backer P. Detection of residues of tetracycline antibiotics in pork and chicken meat: correlation between results of screening and confirmatory tests. *Analyst*, 123, (12):2737-2744, 1998.