THE IMPORTANCE OF LEGISLATION AND FORENSIC FINDINGS FROM THE ANALYSIS OF TURKEY MEAT

ABSTRACT: The aim of this study was to investigate the importance of legislation regarding the process of testing the presence of Salmonella spp. in turkeys for slaughter and forensic investigation of the presence of antimicrobial drugs residues in turkey meat. The investigation was performed on a fattening farm, just before the delivery of turkeys for slaughter. Two pooled faecal samples were taken from turkeys and sent for analysis. Both samples were tested positive for Salmonella spp. Antibiogram was performed after that and the drug of choice for treatment was enrofloxacin. After turkeys were treated with antibiotics, again two pooled faecal samples were sent for analysis and now both were negative. Turkeys were sent for slaughter, but at the same time there were some suspicions that the owner did not comply with the time of the withdrawal period for the antibiotic used and a forensic investigation was performed in order to determine the presence of antimicrobial drug residues in slaughtered turkeys. Samples of liver, kidney and fat of turkeys were taken at the slaughter line and were sent for analysis for the presence of antimicrobial drugs residues. All of the samples were free of antimicrobial drug and the suspicions were rejected. Recommendations were made regarding the improvement of biosecurity and hygiene measures on farms and good animal husbandry practices in order to limit the use of antimicrobial agents.

KEYWORDS: antimicrobial drugs, residue, Salmonella spp., turkey

INTRODUCTION

Infections with Salmonella spp. cause gastrointestinal disorders in humans, causing morbidity, hospitalization, economic burden, and may lead to a lethal
outcome [Pieskus et al., 2006]. The most common route of infection is faecal-oral route, where people can become infected by ingesting the bacteria through contaminated food or water, or by direct or indirect contact with the faeces of infected humans and animals [Fearnley et al., 2011]. Various studies have shown that foods of animal origin, especially poultry and pigs, represent major sources of Salmonella infections in humans [Erol et al., 2013; Stojanac et al., 2013]. Among them, turkey meat and products are attributed to be the important sources of food-borne salmonellosis [EFSA and ECDC, 2012].

Infection of turkeys with Salmonella spp. is usually asymptomatic and detection of the bacterium emerges by random monitoring of the farm [Danguy des D’eserts et al., 2010]. In Serbia, the testing for presence of Salmonella in turkeys ready for slaughtering is regulated by the Ordinance Establishing Programs of Animal Health Protection Measures for 2013 [Sl. glasnik RS, 91/13].

Antimicrobial resistance in food-borne pathogens is of global concern because of the impact on public health. The use of antimicrobial drugs in food producing animals is associated with the emergence of resistant strains of some pathogens in humans [EFSA, 2008]. In turkey production, antimicrobial drugs are used in the treatment of infections in individual animals, but more frequently in the entire flock of turkeys. These antimicrobial drugs are used prophylactically and metaphylactically to prevent spreading of infection from diseased to healthy turkeys in the same building. Also, outside the European Union (EU), antimicrobial drugs are used as growth promoters.

Uncritical use of antibiotics and disregard of the withdrawal period in turkeys, lead to an emergence of antimicrobial drugs residues in meat. Regarding humans, the presence of antimicrobial drugs residues in meat leads to: allergic reactions; toxic, teratogenic and mutagenic effects; resistance of pathogenic bacteria and reducing the therapeutic effect of antimicrobial drugs; disorder of saprophytic intestinal flora and other things. The aim of this study was to investigate the importance of the legislation regarding the process of testing the presence of Salmonella spp. in turkeys for slaughter and forensic investigation of the presence of antimicrobial drugs residues in turkey meat.

MATERIAL AND METHODS

Testing on the farm

At a small turkey fattening farm with capacity of 600 animals in Vojvodina, the fattening was conducted in the period from September to December, 2013. Raising turkeys is performed using the floor system with deep litter of straw, which is added occasionally and the cleaning is carried out at the end of fattening period. Small turkeys, 3–4 weeks old and weighing 750–850 grams, are
brought to the facility. After 90 days of fattening, when female animals weigh 11 kg and male animals 17 kg, turkeys are sent to slaughter.

In accordance with the Law on Veterinary Matters [Sl. glasnik RS, 30/10, čl. 93] animals in transport must be accompanied by the Animal health state certificate issued by the competent veterinary organization according to the Program of measures, and based on the evidence of the preventive measures and diagnostic trials performed. According to the Ordinance Establishing Programs of Animal Health Protection Measures for 2013 [Sl. glasnik RS, 91/13], turkeys intended for slaughter must be free of *Salmonella* spp., and a finding must not be older than 14 days.

Owner of turkeys filed a request for the issuance of the Animal health state certificate. Two pooled faecal samples were collected on the farm from the turkeys and were sent to the relevant institution for analysis. The test was performed using ISO 6579:2002 [ISO 2002].

After 6 days positive results were received, which revealed the presence of *Salmonella* spp. in the faeces of turkeys. Antibogram was performed on the isolated *Salmonella* spp. and the appropriate antimicrobial drug therapy with enrofloxacin was recommended. After the therapy was implemented and the prescribed 7 days withdrawal period was over, re-sampled faeces of turkeys was sent for analysis. The results were negative, i.e. *Salmonella* spp. was not identified in the faeces of turkeys and the Animal health state certificate was issued.

Immediately after the turkeys were slaughtered, a suspicion was raised that the owner of the animals had not complied with the withdrawal period regarding the applied antimicrobial drugs (7 days), i.e. he used it for longer period of time than recommended, and thus shortened the period between the cessation of the use of antimicrobial drugs and the moment of sending turkeys to slaughtering.

Investigation in a slaughterhouse

Three samples of liver, kidney and fat tissue, were taken from the slaughtered turkeys and were sent for analysis for the presence of antimicrobial drugs residues. Sampling and testing was performed in accordance with the Ordinance determining the program of systematic tracking of the residues of pharmacological, hormonal and other harmful substances in animals, products of animal origin, food of animal origin and animal feed [Sl. glasnik RS, 91/09]. The presence of residues of antibiotics was determined using five plates [Gaudin *et al.*, 2010].

RESULTS AND DISCUSSION

Both tested pooled samples of faeces were positive for *Salmonella* spp. The incidence of *Salmonella* spp. in turkeys has been investigated in recent years
around the world [Antunes et al., 2003; Arsenault et al., 2007; Cetinkaya et al., 2008; Fearnley et al., 2011; Padungtod and Kaneene 2006] and the results show that *Salmonella* spp. is often present in turkeys, as well as in our study. Turkeys infected with *Salmonella* spp. represent a source of human infection, and for this reason mandatory testing of turkeys before slaughter is very important [Sl. glasnik RS, 91/13]. Upon isolation, an antibiogram was performed for both samples (Table 1) and the drug of choice was enrofloxacin. The 5-days treatment was recommended, after which two pooled faecal samples were collected again from turkeys and were examined for the presence of *Salmonella* spp. The results obtained were negative, two pooled faecal samples were free from *Salmonella* spp., and a competent veterinarian issued the Animal health state certificate.

<table>
<thead>
<tr>
<th>Antimicrobial</th>
<th>Sample 1</th>
<th>Sample 2</th>
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</thead>
<tbody>
<tr>
<td>Amoxicillin</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Ceftriaxone</td>
<td>S</td>
<td>I</td>
</tr>
<tr>
<td>Enrofloxacin</td>
<td>S</td>
<td>S</td>
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<tr>
<td>Gentamicin</td>
<td>I</td>
<td>R</td>
</tr>
<tr>
<td>Colistin</td>
<td>I</td>
<td>S</td>
</tr>
<tr>
<td>Neomycin</td>
<td>R</td>
<td>I</td>
</tr>
<tr>
<td>Penicillin</td>
<td>I</td>
<td>S</td>
</tr>
<tr>
<td>Streptomycin</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>Tetracycline</td>
<td>R</td>
<td>I</td>
</tr>
<tr>
<td>Doxycycline</td>
<td>I</td>
<td>R</td>
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<tr>
<td>Flumequin</td>
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</tr>
</tbody>
</table>

S-sensitive, I – intermediate, R-resistant.

While the turkeys were in the slaughterhouse for slaughtering, suspicions were raised that the owner of turkeys treated them with antimicrobial drugs just before the slaughtering, i.e. he did not complied with the withdrawal period. At that moment, forensic examination was performed in order to identify potential suspects or the presence of antimicrobial drugs in meat and organs of turkeys. The samples of liver, kidney and adipose tissue of turkeys were taken immediately from the slaughtering line in accordance with legislation [Sl. glasnik RS, 91/09] and were sent for testing for presence of antimicrobial drugs residues. The presence of residues of antibiotics was determined using five plates [Gaudin et al., 2010]. The presence of residues was tested for sulfonamides, amoxicillin, ampicillin, benzyl penicillin G, ceftriaxone, cloxacillin, dicloxacillin, erythromycin, lincomycin, oxacillin, tylosin, phenicols, quinolones, tetracyclines, and
aminoglycoside antibiotics. None of the tested antimicrobial drugs were found in the samples. Widespread use of antimicrobial drugs, especially as prophylaxis and growth promoters, leads to resistance of *Salmonella* spp., and this is especially important because people get sick from salmonellosis via food-borne pathogen. *Salmonella* spp. in the meat is already resistant to most antimicrobial drugs, which is particularly acute in developing countries, where there is a wide and uncontrolled use of antimicrobial drugs [EFSA, 2008; Iossifidou *et al.*, 2012; Rahimi 2012].

**CONCLUSION**

Detection of *Salmonella* spp. in the faeces of turkeys ready for slaughter confirmed the importance of the legislation regarding the control of health of animals and humans. Suspicion of the presence of antimicrobial drugs in turkey meat was eliminated forensically, but overall results from this study indicate the need for improved farming practice including more hygienic measures and good animal husbandry practices in order to limit the use of antimicrobial agents.

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**REFERENCES**


ЗНАЧАЈ ЗАКОНСКЕ РЕГУЛАТИВЕ И ФОРЕНЗИЧКОГ НАЛАЗА У КОНТРОЛИ ЋУРЕЋЕГ МЕСА

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РЕЗИМЕ: Циљ овог рада био је да се испита значај законске регулативе у контроли Salmonella spp. код ћурака за клање и фокензички истражи присуство резидуа
антимикробних лекова у ћурећем месу. Испитивање је урађено на фарми за тов, непосредно пред испоруку ћурака на клање. Узета су два збирна узорка фецesa од ћурака и послата на анализу. Оба узорка била су позитивна на Salmonella spp. Затим је урађен антибиограм и лек избора за терапију био је енрофлоксацин. Након третмана ћурака са антимикробном терапијом, поново су послата два збирна узорка фецesa на анализу и тада су оба била негативна. Ћурке су послате на клање, а истовремено се појавила сумња да власник није поштовао време каренце за употребљени антибиотик и извршено је форензичко истраживање присуства резидуа антибиотика код закланих ћурака. На линији клања су узети узроци јетре, бубрега и масног ткива ћурака и послати на анализу на присуство резидуа антимикробних лекова. Сви испитивани узорци су били слободни од антимикробних лекова и сумња је одбачена. Препорука је да се повећају биосигурносне и хигијенске мере на фарми и добра произвођачка пракса са ограниченом употребом антимикробних препарата.

КЉУЧНЕ РЕЧИ: антимикробни лек, резидуе, Salmonella spp., ћурке