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Antibiotics Resistance in Broiler Chicken from the Farm to the Table in Eastern Algeria

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ABSTRACT

A survey was carried out to collect information on the place of chicken meat in the feed ration of families. It aims at assessing the occurrence of diseases, the method of their diagnosis, the commonly used antibiotics in poultry farms and their impact on the health of humans in the North-Eastern region of Algeria. The survey was based on a questionnaire that was sent to 102 families, 50 poultry farmers and 30 veterinary practitioners in the poultry sector in the region. Our investigation has revealed that the Algerian families' consumption of chicken meat is the highest (85,3 %) compared with the other types of meats. As to the surveyed poultry farmers, the investigation has shown that most of them do not apply the residue disposal waiting times (70%). Concerning the surveyed veterinary practitioners, the investigation has, on the one hand, revealed that the cases of failure of antibiotic therapy are very common (96%), they primarily are due to the development of antibioresistance. It has, on the other hand, shown that veterinarians have become only drug distributors. These investigations have shown that there is a great lack of health monitoring, and a lack of quality of white meat. It has also been noted that there is a massive use of antibiotics and a dominance of anarchic use of veterinary drugs.

Key words: Antibiotics resistance, Consumers, Inquire, Poultry farmers, Veterinary surgeons

INTRODUCTION

During the last 30 years, sub therapeutic levels of antibacterial drugs have been fed extensively in every major livestock and poultry producing country (National Research Council, 1980). The poultry industry uses antibiotics to improve meat production by increasing feed conversion, promoting growth rates and preventing diseases. Antibiotics can be used successfully at sub-therapeutic doses in poultry production to promote growth (Berghiche et al., 2018; Barceló, 2007; Engberg et al., 2000; Kantati, 2011; KhodambashiEmami, 2012; Chattopadhyay, 2014) and protect the health of birds by modifying the immune status of broiler chickens (Lee et al., 2012).

In addition to bio-resistance, antibiotics abuse has resulted in drug residues in animal products (Gonzalez et al., 2017). Several antibiotics such as penicillin, tetracycline, macrolide, aminoglycoside and amphenicol have been detected in foods (Diarra and Malouin, 2014). However, the widespread, and even abusive use of some antibiotics, as curative, preventive or as food additives has led to the development of allergic reactions (Nisha, 2008) and to an increase in nosocomial risk and possible significant increase in the isk of contracting certain cancers (Dobson, 2008) and even to the development of populations of antibiotic-resistant microbes (Endtz and Ruijs, 1991; Allen et al., 1992; Zhang et al., 2003; Khenenou et al., 2011; Khenenou et al., 2012).

The aim of the present study is to highlight the place that chicken meat has in the feed ration of families and its effects on the quality of meat and on the health of humans.

MATERIALS AND METHODS

Ethical approval

The experiment was carried out according to the national regulations on animal welfare and institutional animal ethical committee.

Experimental design

The study was carried out in North-Eastern Algeria through the period from January 2017 to June 2018. The

survey is based on a questionnaire sent randomly to 102 families, 50 poultry farmers and 30 veterinary practitioners in the poultry sector in the region. Each one of the 102 families provided all personal references. Veterinary practitioners and farmers provided three professional references (surname and first name, address, Veterinarian Approval Number, authorization of poultry farming).

All the questionnaires were signed by the surveyed candidates. Questions have been made to collect information on the place of the chicken meat in the feed ration of the families, to assess: the occurrence of diseases; the method of their diagnosis, the commonly used antibiotics in poultry farms and their impact on the health of humans and the therapeutic approaches followed to understand the impact of self-medication phenomena in the region.

Statistical analysis

The collected data are logged and processed using the program (Microsoft Office Excel, 2007) to perform the description and evaluation.

RESULTS AND DISCUSSION

In order to have a clear idea of the various aspects that this study deals with, we have tried to take advantage of all the information that the answered questionnaires provided.

Knowledge of the poultry farmers of the nature of all the drugs used

72% of poultry farmers knew the nature of all drugs used during the rearing period and their dosages (Table 1). Present results are close to the findings of Elmanama et al. (2016) who reported that 87.9% of poultry farmers knew the nature of the drugs and the risks related to an unreasonable use of antibiotics on the health of humans.

Routes of antibiotics administration

The oral route is the most widely used route of administration (98%, Table 2). This is the easiest method being practiced by farmers and offers the possibility of distributing large volumes to several birds at once. This result is close to those obtained by Chevance et al. (2012); Khalen-wouembe et al. (2013); Khenenou et al. (2014); Sinaly (2014); Berghiche et al. (2017) and Khenenou et al. (2017) who found that the oral administration was the commonly used route in poultry farms.

Waiting period

Concerning the waiting time between the administration of the drugs and the slaughtering, it has been shown that 70% of the poultry farmers apply the waiting period; 64% of the farmers stop giving the drugs before the commercialization (Table 3). This result is similar to the reports of Bada-alambedji et al. (2004) who found that 70.7% of farmers applied the waiting period. Another survey conducted by Nkaya (2004) in Dakar revealed that 84.62% of farmers applied the waiting period.

Impact of the antibiotics on the health of humans

Our study has revealed that 72% of the surveyed vets have confirmed that there is a risk for the health of humans related to the unreasonable use of drugs (antibiotics) (Table 4). According to our results, the majority of farmers are aware of the risks of unreasable use of antibiotics.

Table 1. Knowledge of poultry farmers of used veterinary drugs, eastern Algerian (January 2017 to June 2018)

Knowledge of the poultry farmers of the nature of all the drugs used	Numbers	Percentage
Yes	36	72%
No	14	28%
Total	50	100%

Table 2. Antibiotic administration routes

Routes of administration of antibiotics	Numbers	Percentage
Drinking water	49	98%
Injection	3	6%
Food	6	12%
Total	50	100%

Table 3. Application of the waiting periods of drug administration by the poultry farmers, eastern Algeria (January 2017 to June 2018)

Waiting period	Numbers	Percentage
Yes	35	70%
Not	9	18%
Sometimes	6	12%
Total	50	100%

Table 4. Poultry farmers' awareness of the risks that antibiotics have on the quality of chicken meat and on the health of humans, eastern Algeria (January to June, 2017)

Farmers' awareness of the risks of antibiotics for the health of humans	Numbers	%
Yes	36	72%
No	14	28%
Total	50	100%

The frequency of self-medication in the poultry farming Self-medication in the poultry industry

The study has showed that more than 56% of the surveyed vets have declared that self-medication in the poultry farms happens quite often (Figure 1). The results are very close to those found by Sinaly, who found that 79% of farmers practiced self-medication. Hence, they are superior to those of Khalen-Wouembe (2013) who found that 33.64% of farmers, in the western region of Cameroon, did practice self-medication.

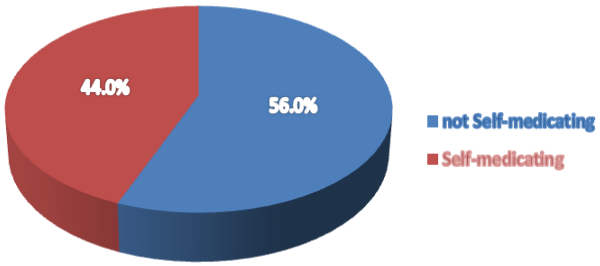

Figure 1. The frequency of self-medication in the poultry farming, eastern Algeria (January 2017 to June 2018)

The problem of antibiotic resistance

Nearly all veterinary surveys have shown that cases of treatment failure are common in the field and most antibiotic molecules are involved (Figure 2). These failures, according to the surveyed veterinarians, are mainly due to the development of antimicrobial resistance (96%). It is important to emphasize that any use of antibiotics eventually leads to the development of resistant microbial strains. The risk of developing resistance is due to the frequent and widespread use of a large proportion of antibiotics in henhouse (Chevalier, 2012).

Low-level antibiotic feeding has resulted in bacterial resistance (Linton, 1977 a; Linton, 1977 b; Braude et al., 1978; Richmond et al., 1980). Large differences have been found in drug resistance of E. coli between animals fed and those not fed antibiotics. The resistance to antibiotics is transmissible. In many instances the resistance is due to the presence of R-plasmids. These R-plasmids are able to mediate their own conjugal transfer in addition to specifying resistance to certain antibiotics ((Linton, 1977 a; Linton, 1977 b; Braude et al., 1978; Richmond et al., 1980).

However, Linton (1977a and 1977b) reported that the spread of the phenomenon of antibiotic resistance is due to the total absence of health monitoring; persistence of drug resistance has been related to the usage pattern of antibiotics.

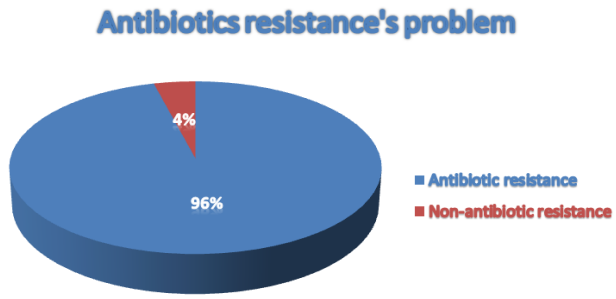

Figure 2. Antibiotics resistance's problem in broiler chicken, eastern Algeria (January 2017 to June 2018)

Frequency of consumption of chicken meat

According to the survey, we have found that chicken meat is highly consumed (85, 3%) compared to other meats mainly because of its low price and good taste. Our results are higher than those of Ramdane (2015) who found that 67% of families consumed chicken meat more than sheep and beef meats.

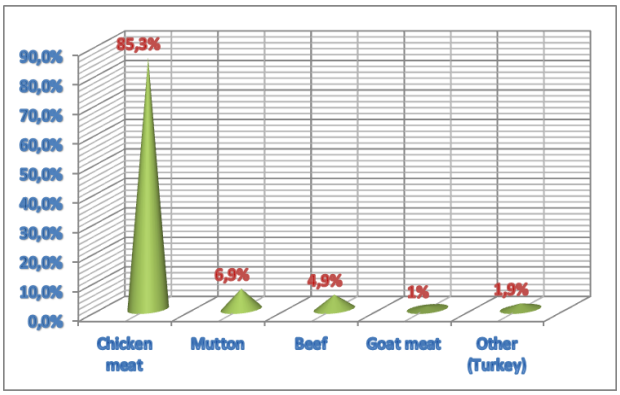

Figure 3. Types of meat consumed in east of Algeria (January 2017 to June 2018)

Place of purchase and type of chicken consumed

Butchers are the main place of purchase because of the hygienic conditions and the medical monitoring of this meat compared to other places of purchase. Modern farmed chicken is more consumed because it is available as carcass in butcheries, whereas farmed chicken requires preparation (sacrifice, plucking and evisceration). It is for these reasons that the public health community and FDA have been proposing to limit use of antibiotics on livestock for more than three decades (see list below). Consumers Union believes that as a prudent measure, we should drastically reduce use of antibiotics on food

animals, and eliminate use altogether for growth promotion or disease prevention in healthy animals (National research council committee, 1980).

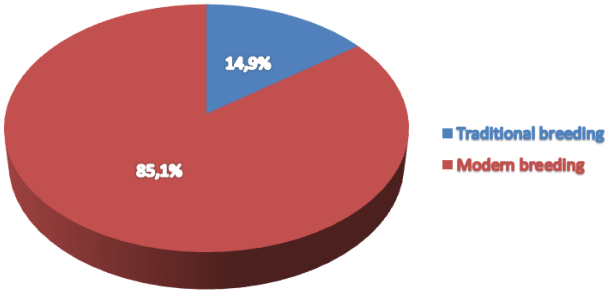

Figure 4. Type of chicken (Hubbard F15) consumed by family in eastern Algeria (January 2017 to June 2018)

CONCLUSION

On the basis of the above results, it can be argued that the Algerian consumer does not have a culture of choice and quality of the products to be consumed, and ignores the importance of the commodity and its origin, whereas he considers the price as the only reference.

Our investigation showed that there is a great lack of medical monitoring and poor traceability of the quality of broiler meat from the farm to the Algerian consumer compared to their counterparts in Tunisia and Morocco; as well as the developed countries, which have put an end to this problem since ten years

DECLARATIONS

Competing Interests

The authors have no competing interests to declare.

Consent to publish

All authors gave their informed consent prior to their inclusion in the study.

Author`s contributions

Berghiche, Khenenou and Labiad were involved in the collection of data, statistical analysis and drafting of the manuscript. Khenenou and Berghiche read and approved the final manuscript.

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