

Kosovo's Public Health Damage from Abusive Use of Antibiotics in Dairy Cattle

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ABSTRACT

Introduction: The aim of the study is to assess the state of the use of antibiotics in dairy cattle in Kosovo according to different diagnosis as directed by treatment protocol and to evaluate the methods of their application in dairy cattle. **Methods:** We've visited over 80% of dairy farms throughout the territory of Kosovo in 2013. Assessment was carried out through a specific questionnaire, which identifies problems with medical treatment of cattle, the number of cattle treated and untreated, description of dose and type of drugs used, as well as the duration of drugs issuance. **Results:** In Kosovo for the treatment of sick cows are mainly used beta lactams and sulfonamides. The drugs were not given only to sick cattle by their diagnosis, but they were given to healthy cattle too, as a preventative therapy, mainly through intramuscular route. **Conclusion:** We conclude that the dairy cattle were not treated correctly as directed by the treatment protocol. In Kosovo's general health system there are no rules and procedures on monitoring and recording the expenditures on antibiotics.

Key words: antibiotics, abuse, public health, dairy cattle, treatment protocol.

1. INTRODUCTION

Today, consumers are facing serious health risks from contaminated milk and dairy products. The contamination is increasingly caused by factors, such as: a) high level of antibiotic residues present in milk, from uncontrolled use of antibiotics in dairy cattle during their treatment, b) contamination of these products with pathogenic bacteria that are resistant to the heat generated from processing equipment, c) the emergence of antibacterial resistance from zoonotic pathogens, and d) their transmittance to humans from food (1).

Milk is the first food we consume in our lives. It is a nutrient-rich and healthy component essential for normal growth and development of an organism (2). However, milk is also prone to contamination from numerous impurities, thus becoming a source conducive to the emergence, growth and proliferation of various microorganisms that cause a series of diseases harmful to public health (3).

In Kosovo milk is mainly used in the milk processing industry with factories processing most of its derivatives, which is then put up for sale on the market. Most of the milk producing farms cooperate with these processing factories however there are other farms which independently and directly market their

milk and dairy products, without any industrial processing (4).

Since 1987, the Food and Drug Administration has requested that pasteurization of packaged milk and its products for human consumption destined for the world market must be mandatory across the world (5). According to World Health Organization "Pasteurization of milk is almost universally accepted as a necessary technology for public health, enjoying public trust and support from consumers" (6).

Marketed milk is a specific food item that requires strict control and enforcement of all legal regulations by the relevant state authorities, which may allow its marketing within and outside the country only with special and official permission (7, 8).

Antibiotics and antimicrobials are used in veterinary practice in therapeutic levels, mainly to treat animal disease and prevent infections from them. However, in many cases they are also used at sub-therapeutic levels to increase feeding efficiency, boost growth, weight gain and speed up general development of young animals (Figure 1) (9).

There is no doubt; even in the use of milk without prior industrial treatment there will be present a level of medication (10). Overdosed use and without specific criteria of antibiotics, such as beta-lactams, sulphonamides, tetracyclines, aminogly-

cosides and macrolides in the treatment of cattle diseases can be very dangerous to consumers of their milk and its products and in particular it can be health damaging to vulnerable groups of the society especially those sensitive to these drugs such as;



Figure 1. The spread of antibiotics and their residues, causing epidemiological settings

pregnant women, infants, children, the elderly, and immunity-compromised patients who suffer from acute or chronic diseases. Of the aforementioned antibiotics, 75% are related to blood serum being at a level above 50% (11).

In the blood plasma antibiotics link themselves to proteins and thus can pass from blood into milk. Some pathological effects that may occur as a result of their residues are: a) transfer of bacterial resistance to antibiotics in humans, b) immunopathological effects c) nephropathy d) liver and bone marrow damage, e) diarrhea f) disbacteriosis, g) allergic reactions, h) urticaria, i) asthma, and j) anaphylactic shock (12, 13, 14).

Antibiotics and antimicrobial resistance is not only a medical problem but also a socioeconomic problem. Infections caused by resistance creating organisms are a lot more difficult to treat. Required drugs against resistant gram-positive and gram-negative bacteria are often not commercially available, are more expensive, more toxic and their cost is increasing (15, 16, 17).

In Kosovo, as in other countries, antibiotics are sold without prescription excessively, which also leads to the creation of resistance.

World Health Organization in its studies concludes that the use of antibiotics as growth promoters of animals should be banned in cases where there is a lack of risk assessment (18). In 2007 the U.S. Food Drug Administration banned the non-therapeutic use of antibiotics on food-producing animals (19).

The presence of illegal concentrations of pharmaceutical drug residues, as a result of their improper use is sanctioned by law from the Directive with the abbreviation; 96/23/EC of the Council of the European Union (20). This directive is transferred to Kosovo legislation, by which regulation the use of antibiotics for prophylactic purposes, growth purposes as well as for purposes of conversion of animals is strictly prohibited and prosecuted by law (21).

The aim of the study is to assess the state of the use of antibiotics in dairy cattle in Kosovo according to different diagnosis as directed by Treatment Protocol and to evaluate the methods of their application in dairy cattle.

2. METHODS AND MATERIALS

To carry out the project we've visited over 80% of dairy farms throughout the territory of Kosovo within a year period, in 2013.

All the farms were accessed during both seasons of the year: the winter and the summer. We've acted so to determine which season cattle fall sick most and consequently receive most antibiotics.

In this field work, we've observed that most cows fell sick during the summer, probably because of the high temperatures, which can cause the propagation of bacteria and other parasites in water, food, soil and air, and in turn, increase the number of various infections and diseases.

In particular, most cases have been noted in those farms that keep cows closed indoors during the summer and a lot less in other farms where cows are allowed out in the fields and open pastures to roam free during the summer.

The access to the farms was by direct drop in and without a notice, leaving it to chance of finding sick cows.

However, to be successful professionally and scientifically in our research we have established contacts with farmers and collaborated with veterinarians, who treat their cattle in order to identify the type of antibiotics used, the dose and time given to the cattle, diseases involved or aims of treatment, as well as the outcome, including the recovery.

Assessment was carried out through a specific questionnaire, which identifies problems with medical treatment of cattle. The questionnaire asks for and includes the following data on: the identity of the farmer, the total number of cattle treated and untreated, the treatment scheme, description of dose and type of drugs used, as well as the duration of drugs issuance. The questionnaire also includes data on subjects who treated the cattle, be that a veterinarian or a farmer, as well as data on duration of the whole treatment.

2.1. Ethical clearance

The study was approved by the Regional Ethical Board at the Food and Veterinary Agency of Kosovo.

2.2. Statistical analysis

In the statistical analysis, differences between normally distributed categorical variables were tested with the chi-squared test (χ^2). For the continuous data, Mann-Whitney test was applied. All statistical analyses were performed with SPSS version 12.0 software with a significance level of 0.5.

3. RESULTS

We've observed that in Kosovo for the treatment of sick cows are mainly used antibiotics of beta lactams, 60.5 % of them, and sulfonamides type, but there are many instances where other types of antibiotics are used too, such as tetracycline, macrolides and aminoglycosides (Figure 2).

From our results we noted that the majority of sick cattle, 72.1% have been treated with Penicillin 200mg, with a statistically significant difference compared with the number of those cows that are not treated with this type of antibiotic ($p < 0.01$). The second drug used most extensively is Streptomycin 250 mg and consequently, or the third drug most extensively used in Kosovo is Enrofloxacin 200mg. Cases of combination of a number of different antibiotics have also been noted, however, in very small percentages (Figure 3).

We found that about 40% of cattle were treated with 2 types

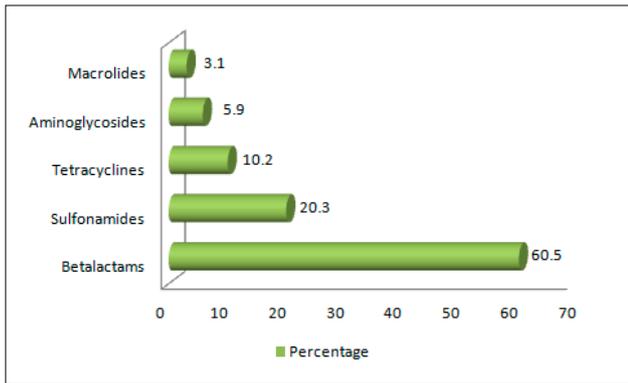


Figure 2. The percentage of cattle treated with antibiotics

of antibiotics. Which is a statistically significant difference when compared to other categories ($\chi^2=36.6$, $p<0.01$). Meanwhile, about 30% of cattle were treated with three types of antibiotics (Figure 4).

From our results we found that the duration of treatment of

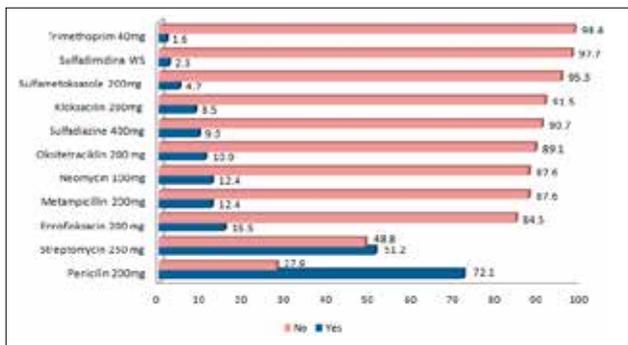


Figure 3. The percentage of cattle treated with different types of antibiotics

sick cattle with antibiotics was a lot more intensive in the first three days and a lot less in the following days (Table 1).

We found that veterinarians were the main decision making factor in the treatment of cattle, reaching a very large percentage of 94.6% (Figure 5).

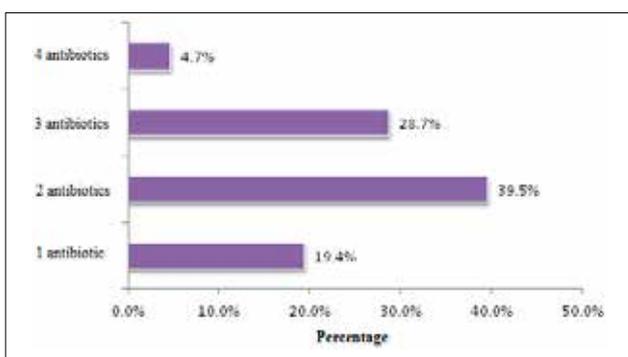


Figure 4. The percentage of cattle treated with one or a combination of two, three and four antibiotics. Mann-Whitney test -0.67 , $p=0.4$

However, in smaller percentage of 5.4%, farmers too were noted as independent decision makers, even-though this is not legal, for reasons already known, such as, risk of creating microbial resistance in cattle, tendencies to cover up the true state of health of their cattle, or allow indiscriminate distribution of contaminated milk in the general market.

The majority of sick cattle was diagnosed with mastitis which has a statistically high difference when compared to other diagnosis ($P<0.0001$) (Table 2).

Days of treatment	Day 1 (%)	Day 2 (%)	Day 3 (%)	Day 4 (%)	Day 5 (%)
Metampicilin 200mg	7	8	0	1	0
Neomycin 100mg	7	1	6	0	2
Kloksacilin 200mg	4	3	4	0	0
Penicilin 200mg	17	12	6	1	0
Trimethoprim 40mg	0	0	2	0	0
Sulfametoksazole 200mg	6	0	0	0	0
Sulfadimidina WS	3	0	0	0	0
Sulfadiazine 400mg	6	0	5	0	1

Table 1. The percentage of cattle treated with antibiotics according to the number of days

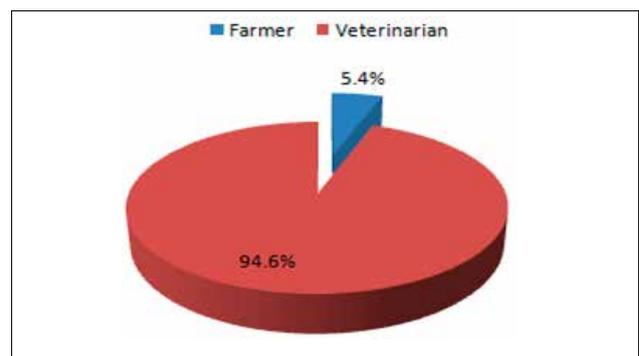


Figure 5. The percentage of the decision taken by the parties in the treatment of cattle

Second to mastitis, we have observed two other infectious diseases of equal occurrence in Kosovo's cattle, such as: a light mammary infection and bronchial pneumonia, but detected in small and not significant percentages.

In most cases and diseases the drug is injected intramuscularly, but with some exceptions where in addition to intramuscular way of giving the drug, the drug was also given through other combined routes, such as: intramuscular + intramammary or intramuscular + vaginal, or using all 4 ways combined altogether.

4. DISCUSSION

Kosovo is a new country, it is less developed compared to other countries in the region and Europe, and it lacks proper professional and legal institutions for the control and safety of the quality of milk, be it homemade or imported.

Dairy factories control and monitor the quality of milk using simple and unsophisticated equipment for the detection of drug residues, promising, in turn, small chances of discovery.

The milk put up for screening depends on farmer's choice and the amount set by the farmer himself, which never happens to be the milk originating from cattle that were treated recently with antibiotics.

Moreover, factories' outdated equipment always fails to discover if the farmer has mixed the contaminated milk with a clean milk of a greater amount, to avoid detection. Thus, the detection of residues in a large quantity of milk is never possible and accurate.

The cattle were not treated correctly as directed by the treatment protocol according to diagnosis, advising that cows must be given the same dose every day. On the first day cattle were given very high doses, the second day they received much lower doses, then, the third following day, the given dose rose back again and then the treatment stopped altogether. Whereas, in

Reason for treatment	Intramammary	Intramuscular	Intramuscular+intramammary	Intramuscular+vaginal
Lactic acidosis	0	1	0	0
Bronchopneumonia	0	11	0	0
Koli mastitis	0	1	5	0
Dermatofibroma	0	1	0	0
Gastroenteritis	0	1	0	0
Viral diarrhea	0	2	0	0
Nechrobacilloza of hoofs	0	5	0	0
Light mammalian infection	6	2	3	0
Intestinal infection	0	2	0	0
Gastric infection	0	1	0	0
Infection of the dog bite	0	1	0	0
Infection of the uterus after calving	0	7	1	1
Intoxication (acute poisoning)	0	5	0	0
Caesarean section	0	4	0	0
Mastitis	4	24	31	0
Parotitis	0	1	0	0
Preventive therapy	0	7	0	0
High temperature + diarrhea	0	1	0	0
Chronic stomach tympany	0	0	1	0

Table 2. The ways of the application of drugs in sick cattle according to their diagnosis

some other cases, when cows did not fully recover a half dose was given to them, on the fifth day. This tells us that regulations are not followed during the treatment of cattle, since antibiotics generally should be given a minimum of 5 consecutive days (22). The same dose must be given every day and at the same time of day in order to achieve a desired effect. In some cases, antibiotics were given to sick cattle intermittently, only on the first day and on the third day of treatment allowing a pause from drug insertion to its deposition in the body of cattle.

Mostly it's done by farmers in order to lower high concentrations of drug residues in milk but also to avoid residue detection during screening by the inspectorate and dairy factories that use they milk for dairy products intended for the market. By applying their own "short treatment schemes", farmers aim to increase their profit margins and cut their losses.

The norms and guidelines on the use of antibiotics as set by European Union, World Health Organization (WHO) and Food Agriculture Organization (FAO) are often ignored. Therefore it is of utmost importance that the state acts urgently, using all its legal and judicial mechanisms, to prevent further penetration of smuggled and counterfeit food products of unknown origin, and at the same time improve its own food monitoring, control and safety measures for homemade produce, such as; record keeping on all treated livestock as well as appropriate use of antibiotics.

According to a report published by Food Drug Administra-

tion, in 1938, 25% of illnesses caused by food contamination were from contaminated raw milk. However, in 2002, the figure has dropped to 1% (23).

Top of the World Union of Scientists in 2001 showed that over 70% of the antibiotics used in the USA are given to food-producing animals, even when they were not sick.¹⁹ Hygiene and milk pasteurization have contributed to the reduction of infant mortality in the USA in 1999.²⁴ Also, in USA between years 1880 and 1907 there were 500 reported cases of milk-borne diseases, while between 1997 and 2006 the number has dropped to 50 (24).

According to a research paper by the WHO in Switzerland in 1998, pasteurization of milk has contributed greatly to the reduction of tuberculosis in humans and animals, as well as the removal of drug residues in milk (25).

From January 1, 1992 to December 31, 2000 the Public Health Laboratory, Center for Infectious Diseases Service in England and Wales, reported 27 cases of infectious intestinal disease originating from raw milk (26).

All the above mentioned factors add to the view that farmers and veterinarians unrestrained and abusive application of antibiotics can lead to the weakening of the immune system, creation of microbial resistance and to unforeseen damage to the public health.

There is "lack of communication" between public health institutions and veterinary health structures regarding the use of antibiotics, in which veterinary health services notifies public health structures on pathologies observed in farms, which in turn would have influenced or directed a proper management and use of antibiotics.

5. CONCLUSION

In Kosovo's general health system there are no rules and procedures on monitoring and recording the expenditures on antibiotics. The whole system lacks evidence on costs involved and as a result health management structures are not able to make true assessment of financial and health situation.

With regards to the milk, its quality and nutritional safety is of paramount importance and here a strict official control must be always applied. On the contrary risk to public health will be exacerbated leading to unforeseen social health cost and damage.

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CONFLICT OF INTEREST: NONE DECLARED.

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