



## Effect of cooking on veterinary drug residues in milk and meat

Rajkishor Gogoi

Department of Veterinary Pharmacology & Toxicology, Apollo College of Veterinary Medicine, Jaipur, Rajasthan, India

### Abstract

The present study is an attempt to review the effect of different cooking procedures on residues of certain veterinary drug in food of animal origin like milk and meat. Most food of animal origin including milk and meat are cooked before consumption. The effect of cooking on residues is required to give a more accurate estimate of consumer exposure to these compounds and their breakdown products.

**Keywords:** cooking, drug, meat, milk, residues

### Introduction

Food safety is of great importance to all involved in the food chain. The problem of veterinary drug residues in food of animal origin remains one of the concerns for the consumers. Residues of veterinary drugs like antimicrobials and anthelmintics may have toxic effects on both animals and humans. Residues of veterinary drugs may be present in our environment, in our food and water. High concentration of antimicrobials and anthelmintics in environment affects the health of man and animals.

Most food of animal origin including milk and meat are cooked before consumption. The effect of cooking on residues is required to give a more accurate estimate of consumer exposure to these compounds and their breakdown products.

### Effect of Cooking on drug residues

Effect of cooking and heat treatment has been reported on antibiotics like Penicillin, Sulfonamide, Nitrofurans, Chloramphenicol, Macrolide and lincosamide (Cooper and Kennedy, 2007; Rose *et al.*, 1996) [2, 8].

Tetracycline (TC) residues are generally considered as relatively unstable compounds. Temperature during cooking has the largest effect on the loss of tetracycline residues (Abou-Raya *et al.*, 2013; Hassani *et al.*, 2008; Kitts *et al.*, 1992; Moats, 1999; Rose *et al.*, 1996) [1, 5, 6, 7, 8]. It was reported that oxytetracycline residue in cattle liver and muscle and sheep muscle was reduced to about 35-94% during cooking processes including microwaving, boiling, roasting, grilling and frying (Rose *et al.*, 1996) [8].

Abou-Raya *et al.* (2013) [1] reported the changes on TCs including oxytetracycline (OTC), tetracycline (TC), chlorotetracycline (CTC) and doxycycline (DC) in chicken breast and thigh by microwaving, boiling and roasting cooking processes and determined the cooking time required to make the cooked sample safer for consumption.

Cooking procedure was one of the most important agents that influenced TC residues. Among various procedures studied, microwaving was the most effective one. It is obvious that the more cooking time, the greater loss of residue. During heat processing, it was identified that the most stable and the most unstable TCs are respectively doxycycline and oxytetracycline. The time required to

destroy 90% of the initial TCs contents are 23.9, 53.2 and 101.6 min for microwaving, boiling and roasting respectively. If cooking temperature and time are sufficient, there was significant loss of TC residues. Therefore, it was said cooking provides safety margin for products containing TCs (Hassani *et al.*, 2008; Kitts *et al.*, 1992) [5, 6].

In study of thermo stability of oxytetracycline, tetracycline, and doxycycline at ultrahigh temperature, it was identified that their destruction follows a first-order reaction kinetic. Regarding sterilization, whereas low temperature-long time treatments (conventional sterilization) would destroy >98% of the initial concentration of the residues of the three antibiotics, high-temperature-short-time treatments (HTST) would leave unaltered residues in the 50-90% range (Hassani *et al.*, 2008) [5].

In most of earlier studies on the effect of cooking on tetracyclines residues microbiological methods of analysis were used. Escanilla *et al.*, 1959 [3] reported a method to study the effect of cooking on chlortetracycline residues in meat. HPLC methods were used in a study on OTC degradation in thermally processed farm salmon (Kitts *et al.*, 1992) [6].

Effect of boiling on the residue level of drugs such as Tetracyclines, Fluoroquinolones and Benzimidazoles in milk and effect of boiling, deep frying and microwaving on the residue level of drugs in meat were observed. The residue level of all the drugs in the milk after boiling reduced significantly. Similarly, residue level of all the drugs in the meat after boiling, deep frying and microwaving also reduced significantly. Microwaving significantly reduces the drug residues in lesser time than boiling and deep frying (Gogoi, 2015) [4].

### Conclusion

It can be concluded that cooking procedures to some extent reduces the residue level of certain veterinary drugs present in food of animal origin.

### References

1. Abou-Raya S, Shalaby AR, Salamal NA, Emam WH, Mehaya FM. Effect of ordinary cooking procedures on tetracycline residues in chicken meat. *Journal of Food and Drug Analysis*. 2013; 21:80-86.

2. Cooper KM, Kennedy DG. Stability studies of the metabolites of nitrofurantoin antibiotics during storage and cooking. *Food Additives and Contaminants*, 2007; 24:935-942.
3. Escanilla OI, Carlin AF, Ayres JC. Effect of storage and cooking on chlortetracycline residues in meat. *Food Technology*, 1959; 13:520-524.
4. Gogoi R. Studies on the status of certain veterinary drug residues in milk and meat of Assam. Doctoral Thesis submitted to Assam Agricultural University, Jorhat. 2015; pp. 87-92.
5. Hassani M, Lazaro R, Perez C, Condon S, Pagan R. Thermostability of oxytetracycline, tetracycline, and doxycycline at ultrahigh temperatures. *Journal of Agricultural and Food Chemistry*. 2008; 56:2676-2680.
6. Kitts DD, Yu CWY, Aoyama RG, Burt HM, Mcerlane KM. Oxytetracycline degradation in thermally processed farmed salmon. *Journal of Agricultural and Food Chemistry*. 1992; 40:1977-1981.
7. Moats WA. The effect of processing on veterinary residues in foods. *Advances in Experimental Medicine and Biology*, 1999; 459:233-241.
8. Rose MD, Bygrave J, Farrington WHH, Shearer G. The effect of cooking on veterinary drug residues in food: 4. Oxytetracycline. *Food Additives and Contaminants*, 1996; 13(3):275-286.