PESTICIDES AND LIVESTOCK

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As it is known, the chemicals that are used against all kinds of pests and plants that are accepted to be harmful in agriculture are generally named as pesticides. These chemicals which are classified as insecticides, herbicides and rodenticides are used widely in Turkey as wall as in other parts of the world. Pesticides, which are generally used to increase the product quality and efficiency as well as to control the harmful population in agriculture, display toxic characteristics for humans and animals (**Anonymous,** 2004). Through frequent use, pesticides cause the formation of reactive oxygen species such as hydrogen peroxide H_2O_2, superoxide O_2- and hydroxyl OH radicals and they affect the human and animal health adversely. These radicals that are capable of reacting with biological macromolecules may cause enzyme inactivation and DNA damage in the organism and they may initiate the peroxidation of polyunsaturated fatty acids (PUFA) through accumulation in fatty tissue. Unless they are removed by the antioxidant defense mechanisms, these oxidants may cause oxidative stress. DNA damage and pathological conditions such as cancer formation are observed as a result of the oxidative stress. The use of pesticides in the battle against agricultural pests is very frequent in Turkey as well. Pesticides from all groups have been included in the pest control program for the past fifty years. The amount of pesticide consumption in Turkey fluctuates regionally and it intensifies in the Mediterranean Region where the polyculture applications are intensely carried out. Similarly, significant enterprises that provide input to the feed industry are also concentrated in this location. 40% of the total annual pesticide consumption in Turkey is materialized in three cities; Adana, Içel and Antalya. The ratio of pesticide use is 10.39% in Adana whereas this ratio reaches up to 15.69% in Içel (**Çömelekoglu et al.,** 1999). These numbers increase more because of the incorrect and the tendentious guidance of the pesticide dealers and unqualified opinions. Questionnaires and research conducted throughout Turkey indicate that both the producers and the consumers of pesticides have almost no knowledge on the topic. Aside from the risk of residues, the misconduct and the unconscious use of pesticides accelerates the corruption of the natural balance of the ecosystems. An inquisitorial approach dictates that special attention should be paid to select pesticides that would not cause problems for the feed stock of animals and for humans, that are not broad spectrum, that are selective, easily degradable in soil and water and least harmful to the environment. The most of the said pesticides are carried away from the area of application through the use of intermediary agents. Through direct application on the plants or through the transfer of the pesticides in the soil into their tissues, the pesticides join the food chain. Specifically, the pesticides that are used for the control of external and internal parasites in milk cattle may cause residues in the milk of the animals. Additionally, the pesticides that are intensively used for the protection of public health in the battle against flying vermin species such as mosquitoes and flies cause residues in animals that are exposed to them and to animal products that have nutritional value. The application of these compounds in inappropriate doses for inappropriate durations together with insufficiency in obtaining the necessary precautions resulted in acute and chronic intoxication together with carcinogenic, mutagenic and teratogenic effects.

The uses in high doses for long durations cause resistance in target pests and contamination in the environment and the food (**Güvenç and Aksoy,** 2010). Among the 700 pesticides that are most frequently used, 33 were classified as very dangerous to human health according to the classification conducted by the World Health Organization (WHO), 48 were fairly dangerous, 118 were moderately dangerous and 239 were minutely dangerous. The pesticide consumption around the world increases every day and 75% of total consumption takes place in developed countries (the US, Western Europe, Japan). In many scientific studies that were conducted, the organic phosphorous containing compounds and carbamates were effective in the organism for 1-12 weeks and 2-4 d atrazine for 1-18 weeks. Chlorinated hydrocarbons may remain in the organism for 2-5 years whereas mercury, arsenic and lead are permanently resident contaminants.

One of the first studies on the determination of the amount of pesticide residues in Turkey was carried out in the Çukurova region in 1974 between May and November on milk samples. The results that were obtained in this study which investigated the residual levels of lindane, aldrin, heptachlor, dieldrin, DDT and endosulfan, indicated that even back then the levels were above the tolerable limits. On the other hand, in a study conducted by **Erdogrul et al.,** 2004, the results indicate that in 37 breast milk samples collected in Kahramanmaras contained DDT and its metabolites, HCB, BHC and its isomers, 11 of them contained PCB and 7 contained polybrominated biphenyl (PBB). The results indicate that p, p'-DDE and p, p'-DDT were detected in all samples and beta-BHC in 97% of the samples whereas alpha-BHC was not detected in any of the samples. On the other hand, the total amount of DDT measured in these samples varied between 0.52 and 315.8ng/g and the mean concentration of BHC isomers was 2.08ng/g and the mean concentration of HCB was 0.30ng/g. Many studies on poultry indicate that the chlorinated hydrocarbons deteriorate the quality of the egg shell lowering its economical value. The use of pesticides was reported to be 0.5 kg per hectare in Turkey. In comparison to the EU countries, Turkey consumes pesticides in considerably less amounts. However, a heterogeneous structure stands out in Turkey in terms of the use of pesticides in agricultural pest control. For instance, the Aegean and the Mediterranean Regions, in which intensive agricultural input is used, constitute more than 1/3 of all the pesticide consumption in Turkey. Evaluation of the topic from that aspect renders the detection of residues in raw milk samples obtained from these regions natural. While most of the studies that were carried out to detect the pesticide residues in Turkey were carried out on various fruits and vegetables, the adequacy of the number of samples to represent the whole population need also be discussed. In addition, the studies should also be enhanced to include residue analysis of the environmental samples together with the foods of animal origin and the human biological samples in order to compare these samples with each other and to conduct the risk evaluation, which is carried out by the specialists.

The use of fungicides in the feed sector is very common in Turkey as it is well known. These chemicals, which are used specifically to prevent the fungal deterioration of the products during storage, may engender residue problems in animal based food products. Many chemicals that are used as insecticides, fungicides and herbicides accumulate increasingly in the food and the feed chains as a result of erroneous and ignorant use. This phenomenon, also known as the concentration of the food chain, also induces the development of resistance in time through overdose. Again in recent dates, it has been ascertained that the minimal amount of mercury in the wastes of a factory in Japan producing aldehydes using mercury as the catalyst that were released into the sea water resulted in the biological concentration of the residual mercury in 3000 fold in the fish and specifically in the shellfish and that in 1 kg of sea product, the concentration reached as high as 10 mg resulting in deaths and effects on the unborn infants in pregnant women in those fishermen and in their families who consumed those products abundantly. In a similar research regarding the same topic (**John et al.,** 2001), the radical damage caused by the organophosphate containing pesticides (OP) and the effect of Vitamin E on these damages have been in-

vestigated. The results of the study that has been conducted for 6 weeks on rats indicated that the lipid peroxidation increased in the OP introduced animals whereas it decreased in the OP introduced animals that were initially supplemented with Vitamin E. Again in the rats that were introduced dimethoate and malathion, the total –SH content, the SOD and the CAT activities were observed to increase in the erythrocytes. In a similar study (**Seth et al.,** 2001), in the rat blood samples that were withdrawn in order to investigate the subchronic/chronic effects of propoxur, lipid peroxidation, OFR dampening enzymes and the glutathione levels were determined. Following a 30 day exposure to propoxur, a dose dependent increase has been identified in superoxide dismutase and catalase activities, glutathione peroxidase, glutathione reductase and glutathione-S-transferase activities whereas a decrease has been observed in the blood glutathione levels. Similarly, **Gupta et al.** (2001) have conducted a study in order to investigate the dosage-time dependence in toxicity of pesticide origin. Quinalphos has been administered to baby rats that are 10 days old at a concentration of 0.5 mg/kg until they are 21 or 45 days old and another group has been delivered quinalphos until the babies were 21 days old and the study was concluded when they were 45 days old. The AchE amount in the brain and the blood has been detected to be lower as the result of the quinalphos application. In another study (**Hazarika et al.,** 2003), Malathion was shown to lower the amount of glutathione (GSH) in the blood and the liver in rats after anilofos administration following malathion pretreatment. The glutathione-S-transferase activity in the liver has decreased following the application of either malathion, anilofos or both chemicals.

The use of organophosphates is common in Turkey as well as in other parts of the world. In a study that was conducted to identify the effect of quinalphos, commonly used pesticide of the organophosphates class, on the oxidant-antioxidant system, two different doses of quinalphos; 250 mg/kg and 500 mg/kg has been delivered to rats and at the and of the process, the MDA level was detected to increase more in rats that have been administered lower doses of the pesticide. The free radical dampening enzymes (SOD, CAT and GST-Px) were shown to display higher activity in the rats that administered higher doses of quinalphos in the study. This condition designates some physiological defense mechanisms taking action at higher dose administration. In another related study (**Kale et al.,** 1999), it was proposed that pesticides might have induced cellular damage in the erythrocytes while being transported into the liver through the bloodstream to be metabolized. Enzymes such as the superoxide dismutase that dismutes the superoxide anion and the catalase breaking down H_2O_2 into water and molecular oxygen in the erythrocytes enable the resistance against pyrethroides-mediated oxidative stress. Other antioxidants such as the glutathione, which is required to reduce H_2O_2 through glutathione peroxidase, have significant roles in the attenuation of the toxic effects of the reactive oxygen species.

RESULTS AND DISCUSSION

The environmental pollution inevitably results in the contamination of the food and the feed chain. Due to that reason, the grazing of the animals on contaminated soil or feeding with contaminated feed stocks result in contamination of the meat and the milk products. Contamination is encountered in the meat and the eggs obtained from the chicken that was grown in contaminated farms and in fish inhabiting polluted waters.

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SUMMARY

All concentrated raw materials are naturally contaminated with various yeasts, fungi and bacteria. These live features may proliferate rapidly under desirable circumstances undermining the performance of the animals that feed upon them and giving way to serious health issues in those animals. However, in the past few years, the use of pesticides in high concentrations in the livestock sector and in agricultural fight has brought along the presence of residues and related health issues. The wide and the unconscious use of pesticides in their respective areas have accelerated its environmental accumulation. These chemicals, which also have the capability to easily accumulate in other nutrients cause serious health issues in humans when they are taken in to the body through the food chain. Pesticides, negatively affecting the health of human beings and animals via causing the formation of reactive oxygen species such as H_2O_2, O_2- and OH, may result in enzyme inactivation and DNA damage in the organism.

Key words: *Pesticides, Feed, Livestock*