Impact of Pollution on Animal Products
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Series C: Environmental Security
Impact of Pollution on Animal Products

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The international advanced research workshop funded by NATO and entitled “impact of pollutions on animal and animal products” was organized at Almaty (Kazakhstan) on 27–30 September 2007. Thirty-one scientists from 12 countries (Kazakhstan, Kirgizstan, Azerbaijan, Ukraine, Russia, France, Great Britain, Italy, Belgium, Romania and Morocco) presented conferences at this meeting to share their experience and results. The programme included three main aspects: (i) generality on the pollution situation in Central Asia and former Soviet Union republics, (ii) the pollution area and pollution origin in Central Asia and Western countries in relation with animal health, and (iii) the relationships between soil contamination, plant contamination and animal products status. The present workshop contributed highly to the exchange between scientists giving the opportunity for researchers from Central Asia to access to new scientific approaches and methodologies, and for European scientists to assess the extent of the environmental problems in this part of the world. No doubt that these exchanges were the main success of the workshop marked by very stimulating discussions. Such meeting was also the opportunity to put on the first stone of a scientific network focused on the subject of the workshop.

The importance of pollution in Central Asia in general and in Kazakhstan in particular is a well-known feature and several references are available on the source and localization of pollution problems in those countries. The references are also abundant on the impact of the environmental failures on human health. The Kazakh Academy of Nutrition, one of the partners of this workshop is involved for several years in food safety assessment for human consumers. On contrary, the place of the animals between contaminations of the resources for animal feeding and drinking, and the human consumers of animal products is widely understudied.

Yet, animals play several roles in the links between environment and human health. The domestic and wild animals, both terrestrial and aquatic ones, could be considered under three aspects: (i) they are the final receptor of pollutants and therefore, they can be affected by the chronic or acute toxicity of organic and non-organic pollutants presents in their environment or in their food; (ii) they can be a “sentinel” of the polluting status of the environment and therefore, the assessment of their status vis-à-vis the pollutants is quite essential to identify the environmental risks; and (iii) they are a provider of pollutants for the human consumers through their products (milk, meat, eggs, wastes) with sometimes a role in the chronicle concentration of some undesirable molecules in food.

For all these aspects, several research fields have to be solicited: veterinary sciences, epidemiology, ecology, chemistry, biochemistry, animal and human nutrition, ecotoxicology, animal production and so on. So, the study of the impact of pollution on animals and animal products needs absolutely a multidisciplinary approach including holistic and analytical aspects. Thus, in the perspectives for a future collaboration between the participants of this workshop, it is expected to propose a concept note for a common project including several disciplines and field of research in order to cover the complexity of the role of livestock in the pollutant flow between environment and man.

The final recommendations of the workshop were proposed in that way, with the clear objective to construct a common project by identifying the priorities in further researches and by proposing the strategy for prevention of pollutants in animal products in relation with policy makers. Such concept note has to be proposed in the frame of the
7th UE community research programme or other funding agencies having the environment preservation and protection as finality.

Finally, the co-directors of the advanced research workshop are indebted to NATO and secondly to the French Embassy in Kazakhstan for their support in this meeting. Three institutions were involved in the general organization: the international cooperation centre for agronomic research in development (CIRAD-France), the Kazakh Academy of Nutrition at Almaty and the Al-Farabi University (KazGu, Kazakhstan), especially the department of bio-technology, biochemistry and plant technology. Their collaboration was able to overcome the traditional difficulties for organizing international meeting in spite of the language barrier and of the different scientific culture. It must be recalled also that this meeting was possible because an already long scientific collaboration was existing between the partners of the organizing committee. All of them consider the Advanced Research Workshop organized at Almaty as an essential milestone of their current cooperation on milk quality.

Dr Bernard FAYE and Pr Yuriy SINYAVSKIY
Co-directors and scientific editors
OPENING SESSION

Generalities on the role of institutions in the field of pollution assessment for animal and human health

Abstracts of the opening ceremony and full conference of L. Astanina
HEALTH OF MAN: YESTERDAY, TODAY, TOMORROW

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Until the XX century high newly born infants’ and children’s death rate was normal. Due to the unsaturated and poor nutrition the low height, the diseases like measles, smallpox, and tuberculosis have been destroying the communities. Normal life expectancy in Antique Rome was 25 years, in England of XVII century – 35, of the middle of XIX century – 45. The sudden increase of life expectancy was occurred at the end of XIX – the beginning of XX century. In last 80 years it has grown in Chile for 2.5 times, and in the USA – 1.5 times. In China in second half of XX centuries it has increased for two times, while in the Southern Africa countries – only for 15%.

This growth, independent of economic level, was due to eradication of smallpox, sharp decrease in diseases poliomyelitis, diptheria, hoping-cough, measles, and progress in the field of preventive maintenance and prophylactic, behavioral changes and investments in education, but it was not due to incomes growth.

The speed of Americans’ wealthy level growth due to increase in life expectancy was higher than the real incomes; economic growth of Great Britain during industrial revolution was for 50% linked to feeding improvement. Between 1960 and 1990 up to 15% of total economic growth is forced by death rate decrease and the increase in life expectancy for 1 year produces the national income growth for 4%. The probability of death of age less than 5 years and risk of female death rate is linked directly to economic growth. The alimentary-dependent diseases such as cardiovascular pathology, cancer, diabete and bony rarefaction represent 60% of total deaths and it will grow up to 73% by 2020. The WHO claims that nowadays a human can live 90 years and even more without diseases.

ORGANIZATION AND EXECUTION OF SANITARY-EPIDEMIOLOGIC CONTROL FOR ANIMAL PRODUCTION PRODUCTS IN KAZAKHSTAN

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Ministry of Healthcare, Committee of State Sanitary-Epidemiologic Control

The article gives review of the influence of the environment to food products contamination and impact of persistent organic pollutants on the pathology of children diseases.

The high level of nitrates contamination in republic allows us to say that in most of the regions the early vegetables and melons and gourds are the most contaminated products. Heavy metals control and control for listed pollutants and polychlorinated biphenyls and their wastes in food and water require a periodical analysis and understanding to establish the flexible planning and monitoring permitting evaluation of environment contamination situation.
INFLUENCE OF THE MAIN CONTAMINATION SOURCES ON THE FOOD PRODUCTS QUALITY

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Strengthening of the population health by maximal possible diminution of the possible negative influences by harming environmental factors is one of the most important problems of the state. Population supply with environmental pure production with high taste and nutritional value is one of the state priorities.

The last years’ researches proved negative impact of the air, soils and water pollutants on the environmental characteristics of the food products. The environment quality deterioration in Kazakhstan is caused by the various factors. One of them is environment pollutions caused by oil and gas industry. For example, the results of the morphological studies of the animals and fishes identified high concentrations of heavy metals and oil products in their tissues and organs.

The next very important factor is pollutions by the former nuclear sites. Nowadays the water supplying horizons represent considerable danger for animals, soils, plants and consecutively for a human. It is identified that gamma-radiation level from the soils and dusts at the certain areas is more than 100 mR/h while the desired level is 8–10 mR/h.

Thus, population supply with environmental pure production with high taste and nutritional value is very important and necessary task.

STRATEGY OF SANITARY-EPIEMIOLOGIC SERVICE FOR POPULATION PROTECTION FROM POLLUTANTS

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Due to the problem of environment contamination, the food products may contain the different contaminants having potential danger for a human health.

The development of systems and methods of safety provide is an important state goal. The state offices of sanitary-epidemiologic control achieve the per-manent control of the objects producing and selling the animal products. The special attention is paid for the organization and execution of the laboratory methods for pollutants identification in food.

Ministry of Health of the Republic of Kazakhstan gives attention to strengthening the material and technical base. According the State Program “Reforming and development of healthcare in Kazakhstan for 2005–2010” there were made many actions on modernization of all laboratories of sanitary-epidemiologic expertise. The equipment corresponding to the international standards was bought for those purposes.

The sanitary-epidemiologic service has 217 sanitary-hygienic laboratories, centers of sanitary-epidemiologic expertise which do monitoring of raw and food products contamination by the most dangerous pollutants such as salts of heavy metals, nitrosamines, mycotoxines, pesticides, antibiotics and others.

Republican sanitary-epidemiologic station has nine profile laboratories. The newly bought equipment is used for complicated arbitrate and certification studies, of the separated cultures, decrypting the etiology of epidemic diseases and for training of the
specialists in sanitary-epidemiologic expertise, getting the practice experience and skills for new equipment and methods.

The employees of the Republican sanitary-epidemiologic station and oblasts centers of sanitary-epidemiologic expertise have the educational and training programs in different countries abroad (Russia, USA, Egypt, Canada, Malaysia, China, etc.). The Republican san-epid station has created in Kazakhstan the only laboratory for asbestos studies corresponding to international standards. The new equipment and apparatus allowed us to implement new modern technologies in laboratory services.
THE ROLE OF PUBLIC ORGANISATIONS IN REALISATION OF STOCKHOLM CONVENTION ON POPS (PERSISTENT ORGANIC POLLUTANTS) AND OTHER IMPORTANT PROCESSES OF CHEMICAL SAFETY

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Abstract: The main part of the POPs in Kazakhstan is constituted of pesticides. The industrial POPs are obtained and used on the factories of energy production, oil treatment and chemistry production. In Kazakhstan large quantities of pesticides, inappropriate conditions of storage and packaging, the possibility of unauthorized access and non-controlled use of packaging, the big risks for human health and environment, especially at the moment of natural incidents, all those factors raise the problem of including the pesticides into the list of environmental and social problems of high priority and they demand efficient and fast decision.

Nowadays the countries of Central Asia suffer the same problems of chemical contamination and their negative influence onto the human health and environment. The Central Asia countries have stocks of old and useless pesticides and at the same time there are no reliable monitoring and environmental control systems, also there are no burial grounds corresponding to the qualification requirements.

As the Stockholm Convention supposes the public participation in toxic substances problems the environmental NGO have accumulated certain experience in advancing the Stockholm Convention, making some informative actions and campaigns and executing some projects. Now Kazakhstan, Kyrgyzstan and Tajikistan are the members of the Stockholm Convention. This article describes the experience of Environmental Analytical Agency “Greenwomen” and other NGO of the public participation, the principles of cooperation with the government offices.

Keywords: Chemical pollution, public participation, contamination control policy

1. Introduction

Persistent organic pollutants (POPs) among other chemical substances are especially dangerous in Kazakhstan. They are heterogeneous group of chemical agents. POPs are highly toxic and even very low concentration may harm wild nature and human health. Chemical compounds and mixtures of this group are air-, water- and migrating animal-borne, as well they might precipitate at large distance from the emission point, accumulating in land and water ecosystems. Currently Central Asian countries face the same problems related to chemical pollutants and their deleterious effects on human health and environment.

Republics accumulated stocks of dusty and unusable pesticides (chemical agents used against plant pests and for extermination of weeds). There are no reliable systems on monitoring and ecological control of use and import of harmful toxic agents, there are no or insufficient number of ranges-burial grounds meeting qualification requirements for burial of harmful chemical agents.

In Kazakhstan there are about 25 million hectares of plough-land and until 1990s pesticides were used all over these lands. The total annual volumes of pesticides made 35,000–40,000 t. In 1986–1995 the volumes of chemical plants protection reduced to 1800 t. The pesticide load on 1 ha of ploughed field also reduced. Since 1998 pesticide volumes increased and currently make 9,000–11,000 t. Herbicides and fungicides compose the major part of plants protection.

In spite of the fact that in USSR DDT (dichlorodiphenyltrichloroethane) was forbidden in 1971, it was used in Kazakhstan in veterinary and medicine till 1990s.

In 1985 DDT and DDE was found in water along the piece of Syr-Daria River from boundary allotment with Uzbek SSR till Kazalinsk Town. By that time deaths of birds
and fish was reported there. In the bodies of died fishes and birds was found DDT and its metabolites.

In 1982–1987, 14 cases of fish deaths were registered on the territory of Kazakhstan. Those deaths occurred due to accumulation of chlorine organic pesticides in water reservoirs. Thus, in 1987 DDT was found in one third of examined reservoirs: in water, aquatic vegetation, in invertebrate organisms, in internals of fish, in bottom sediments.

As for contamination of soils in Kazakhstan: the mean value of DDT residual quantities fluctuated from 1.2 to 5.9 MPC. In 1994, 12,000 of soil samples were taken; of them tenth part was contaminated with chlorine organic preparations. In 1993, this indicator reached one fifth. Based on this we might conclude that 10–20% of soils are contaminated with chlorine organic pesticides, with possible DDT and other SOP-pesticides presence.

Chlorine-containing pesticides are notable in the list of forbidden pesticides. These are aldrin, dieldrin, DDT, heptachlorine, GHCG, polychlorinepinen, polychlorinekamphen. In the Republic the number of disabled pesticides grows every year, the number of rendered harmless preparations and package, of course, decreases.

Fusty pesticides on the territories contaminated with salt of heavy metals and radioactive nuclides are of major concern. Among stocks of unused pesticides there are preparations used in agriculture over 40 years ago.

Large quantities of unwanted and fusty pesticides along with improper storage and package conditions, possibility of unauthorized access and uncont-rolled use of package for domestic purposes, large risks for human health and environment, especially during natural disasters and man-caused incidents (floods, fires, catastrophes, etc.) raise the problem of inclusion the fusty pesticides into the list of priority ecological and social problems in Kazakhstan, requiring immediate and effective solution, in particular, soonest ratification of Stockholm Convention in Kazakhstan. As Stockholm Convention presumes involvement of public into issues related to toxic substances, since 2002 ecological NGOs of Kazakhstan perform certain activity for “Greenwomen”.


Central Asian non-governmental organizations participated in International POPs Elimination Network Project in EECCA Region (Eastern Europe, Caucasus, Central Asia). Coordinator of International POPs Elimination Network Project in EECCA Region is Ola Speranskaya (“Eco-Concord” Center, Russia).

2. Experience of Central Asia: The Role of Community

Since June 2002 Project on raising awareness of State structures, NGOs, mass media and other stakeholders on POP problem was implemented in Central Asian countries. POP experts from Central Asia, NGO Environmental Analytical Agency “Greenwomen” (Kazakhstan), Center “Gender: innovations and development” (Uzbekistan) participated in the Project. Regional Ecological Center of Central Asia (REC CA, Kazakhstan) funded the Project.

Different activities were implemented in the frame of the project in Central Asian countries. In Kazakhstan Project’s activity was focused on the following: