

**Proceedings of the Workshop on
'Fixation of Maximum Residues Levels for Pesticides, Veterinary
Drugs and Antibiotics in foods prepared from Animals, Poultry,
Fish and Processed foods' held on February 1-2, 2016**

The Workshop on 'Fixation of Maximum Residues Levels for Pesticides, Veterinary Drugs and Antibiotics in foods prepared from Animals, Poultry, Fish and Processed foods' was held on 01.02.2016 and 02.02.2016 at Gulmohar Hall, India Habitat Centre, New Delhi. More than 100 experts from India and abroad participated in the workshop.

Dr. S.C. Khurana, Consultant, FSSAI extended a warm welcome to all the participants and requested Shri Kumar Anil, Advisor (Standards), FSSAI to welcome the dignitaries with floral bouquets. He further introduced CEO, FSSAI to the participants and requested him to give welcome address.

Welcome address by CEO, FSSAI

At the outset, Shri Pawan Agarwal, CEO, FSSAI welcomed Dr. Leonard Ritter and Dr. Joe Boison, the experts from Canada; Dr. D. Kanungo and all the participants representing Government Organizations, Regulatory Authorities, Industry and Academia. He mentioned that food safety is very challenging issue as it touches upon the lives of all citizens and pointed out that special care should also be taken for non-vegetarian foods which are being consumed by a large segment of the Indian population. Therefore, in this direction, understanding Standards relating to pesticides, veterinary drugs, antibiotics and their residues in food chain is very important. He emphasised the need of having proper framework for ensuring safe food in the country and which should be at par with the global Standards. With this objective and direction, this workshop is being held. He further stated that participants will get an opportunity of learning from the Canadian experts since Canada is a developed country and far ahead in the area of food safety. Finally, he congratulated Shri Kumar Anil, Dr. S.C. Khurana and their team for conducting this event. He wished that deliberations during the workshop will be meaningful and helpful to FSSAI in framing better standards in the area of food safety.

Dr. S.C. Khurana informed the participants that the Chairperson, FSSAI could not attend the workshop due to health related issues. Further, he invited Dr. D. Kanungo, Chair, Scientific Panel on Pesticides and Antibiotics Residues to brief the participants about the workshop.

Dr. D. Kanungo thanked CEO, Shri Kumar Anil, Dr. S.C. Khurana for giving this opportunity to him and Dr. Leonard Ritter and Dr. Joe Boison for coming. He recalled that this idea conceptualised almost three years back and now got implemented in the form of this workshop and echoed the views given by the CEO. He mentioned about the misuse of antibiotics in human and veterinary practices and agriculture leading to resistance which is due to easy accessibility. Unless we have control over residues left in meat and meat products, chicken, milk etc. we cannot control the therapeutic use of veterinary drugs and antibiotics in meat and chicken. He further mentioned about the export of various food commodities viz. meat & meat products, egg & egg products, milk & milk products and stressed upon the need to have safe food along with good Standards for food products to compete in international market and facilitate the export trade. He also emphasized the need to have Standards for processed food products viz. tomato ketchup, tomato juice, orange juice etc. He stated to get the help of Canadian experts in this regard through their experience. He further briefed the participants about the workshop that how it would be proceeded as per the agenda.

Thereafter, Shri Kumar Anil gave vote of thanks to Chairperson and CEO, FSSAI for providing support in conducting this workshop, Dr. D. Kanungo for his guidance, Dr. Leonard Ritter and Dr. Joe Boison for coming all the way from Canada and agreeing to share their experiences in this area, Dr. S.C. Khurana and team for their support, Dr. Paturkar, BVC Mumbai; Dr. J. Padmaja, NIN, Hyderabad; Dr. Aditya Jain, NDDDB, Anand; and Dr. S.N. Panda, CIFT, Kochi who were to make presentations in this workshop.

Technical Session I was chaired and co-chaired by Dr. D. Kanungo and Shri Kumar Anil respectively. First, Dr. Leonard Ritter, Professor Emeritus (Toxicology) and Member- JECFA of FAO/WHO made a presentation on 'Succinct Review on Principles of Toxicological Hazard and Risk Assessment'. The presentation was

focused on the risk assessment and its management, various types of dosages viz. Acceptable Daily Intake (ADI), No Observed Adverse Effect Level (NOAEL), toxicological ADI, Acute Reference Dose, microbiological ADI etc. and their determination, aggregate exposure, cumulative risk i.e. pesticides with common mechanisms of toxicity, concept of Threshold of Toxicological Concern (TTC) and overview on antibiotics debate.

The presentation highlighted major assumptions in risk assessment, use of uncertainty in the default assumptions to predict safety of residues in food, new concept-risk cup representing all exposures that meet the new standard of reasonable certainty of no harm, regulatory authorities involved in assessment of the effects of antimicrobial drug residues from food of animal origin on the human intestinal microbiota [Food and Drug Administration (FDA); Joint Expert Committee on Food Additives (JECFA); European Medicines Evaluation Agency (EMA/CVMP); Veterinary International Cooperation on Harmonization (VICH); Codex Alimentarius Commission (CAC); Other National Regulatory Authorities (Health Canada)], consideration of document VICH GL-36/FDA GFI #159 in evaluating the safety of residues of veterinary drugs in human food.

The following points were referred as way forward:

- Use of more realistic residue/exposure values from supervised trials; use of median rather than max residues;
- Recognition of new innovations to refine estimates of residues, including concepts such as “edible portion”, “processing factor” and regional consumption;
- Generation of data to support national consumption rather than international default values;
- Probabilistic, rather than deterministic, exposure assessment providing a distributional analysis of exposure to residues;
- Specific population subset assessments;
- Application of more biologically relevant uncertainty (safety) factors;
- Derivation of a more reliable “NOAEL”.

Thereafter, Dr. Joe Boison, Senior Research Scientist, Centre for Veterinary Drug Residues, Canadian Food Inspection Agency and Member-JECFA of FAO/WHO made

a presentation on 'Evaluating MRLs for Veterinary Drugs and Pesticide Residues' delineating the purpose and nature of Codex Standards, derivation of MRLs for pesticides and veterinary drugs, role of Good Agricultural Practices in the use of pesticides (GAP) and Good Practices in the use of veterinary drugs (GVP), antimicrobials, risk analysis- procedure followed by the Codex, components, types of methods of analysis and general criteria for their selection, evaluation of residue data involving identity of compound, conditions for use, dosage, pharmacokinetics and metabolism of substances in both laboratory and food producing animals, identification of marker residue and target tissues, Tissue Residue Depletion Studies which provide the necessary data/information on residue depletion in food-producing animals upon which MRL recommendations will be based, Radiolabelled Residue Depletion Studies which provides key information on the total residues found in various tissues and excreta and data on concentrations of the marker residue especially in the four tissues namely fat, kidney, liver and muscle, and milk when the product is used in dairy animals or eggs if the product is used in egg-laying poultry, calculations for determination of dietary intake using marker residue (MR): total residue (TR) ratio, marker-to-total residue conversion factors, Residue Depletion Studies with Unlabelled Drug and bioavailability of bound residues, residue evaluation process followed by JECFA, Appraisal where the key facts which have been established from the evaluation of the dossier, with the assessments on the quality and completeness of the studies summarized, exposure assessment- chronic and acute, calculations for determination of Daily intake- Theoretical Maximum Daily Intake (TMDI) and Estimated Daily Intake (EDI). Further EDI was pointed out as new estimate of exposure.

The following documents were also recommended to be referred for further information:

- VICH GL46 (MRK), Metabolism and Residue Kinetics - Studies to evaluate the metabolism and residue kinetics of veterinary drugs in food-producing animals: metabolism study to determine the quantity and identify the nature of residues,
- VICH GL 48 (MRK), Metabolism and Residue Kinetics – Studies to evaluate the metabolism and residue kinetics of veterinary drugs in food-producing

animals: Marker residue depletion studies to establish product withdrawal periods.

Technical Session II was chaired and co-chaired by Dr. G.S. Toteja, ICMR, New Delhi and Dr. Anu Appaiah, CFTRI, Mysore, respectively.

Dr. J. Padmaja made a presentation on 'Fixation of MRLs for Pesticide Residues in Processed Foods: Modalities'. The presentation was focused on processed foods and highlighted various types of food processing, effects of food processing on the pesticide residues, factors influencing MRLs for Pesticide residues in the processed foods etc.

Dr. S.N. Panda made a presentation on 'Modalities for fixation of MRLs in Fish including Risk Assessment' wherein status of Fisheries Sector, national and international regulations for pesticides and antibiotic residues in Fish & Fishery Products, data of pesticide residue in Fish & Fishery Products for the period 2003-2015, sources of pesticide contamination in fish including marine and inland, use of approved and unapproved and prohibited antibiotics in Fish & Fishery Products, evaluating data of risk assessment of antibiotics were presented.

The following points were referred as way ahead:

- Requires systemic and architectural changes in regulation of food from aquaculture and fisheries;
- Establishment of National Residue Monitoring Plan;
- Creation of National Residue Database on digital platform;
- Phasing out of growth promoters/prophylactic agents from aquaculture practices; and
- Expansion of current list of approved antibiotics for aquaculture.

Technical Session III was chaired and co-chaired by Dr. K.K. Sharma, IARI, New Delhi and Dr. S.C. Khurana respectively.

The session began with presentation made by Dr. Aditya Jain on 'Modalities and Protocol for Fixation of MRLs in Milk and Milk Products including Risk Assessment'. The presentation was mainly in the context of milk and milk products wherein path of residues of pesticides and veterinary drugs in milk and therefrom in milk products, protocols for assessing risk assessment were highlighted along with some suggestions which are as follows:

- Collaborate with relevant institutions for planned data generation/sharing;

- Training to develop expertise;
- Emphasis: Effective documentation of risk assessment/management activities;
- Sustained follow-up to address data gaps and uncertainties identified; and
- Periodic review.

Dr. Paturkar made a presentation on 'Incidence of Antibiotic and Pesticide residues in Poultry Products and Protocol for fixation of MRL' wherein status of poultry sector, incidence of antibiotics and pesticide residues, outcome of research studies on Quality Assurance and Monitoring of Foods of livestock and poultry and on-going study on Risk Assessment Model Antibiotic In Poultry Meat at Western Region Referral Laboratory for Meat and Meat Products, Mumbai were explained including Risk Analysis Protocol for Eggs, protocol for fixation of MRLs. The presentation was concluded with the following points to consider:

- Surveillance data on pesticide and antibiotics must be taken in to consideration while considering TMDI(Theoretically maximum daily intake)and Acceptable daily intake; and
- If calculated MRL is higher for any pesticide MRLs fixed by Codex are taken into consideration.

Technical Session IV was chaired and co-chaired by Dr. A.K. Dikshit, IARI, New Delhi and Dr. R.K. Soni, DMCH, Chandigarh respectively along with Dr. Balakrishnan Murthy, Visiting Prof. SRM University and Former Director, IIBAT, Chennai.

Dr. A.K. Dikshit requested Dr. D. Kanungo to brief the participants about hand on exercises and constitution of groups. Dr. D. Kanungo apprised the participants with constitution of five groups and exercises to be done.

Then, Dr. Joe Boison made a presentation on 'Dietary Exposure Calculations'. He detailed the participants about new approaches for estimating drug residues i.e. Global Estimate of Acute Dietary Exposure (GEADE) and Global Estimate of Chronic Dietary Exposure (GECDE), their method of determination, Dietary Consumption Factors (food basket items) which are used in the dietary intake calculations on a standard food basket and used by JECFA.

Thereafter, Dr. Leonard Ritter presented case studies on 'tylosin' a macrolide antibiotic produced by fermentation from a strain of the soil microorganism, *Streptomyces fradiae*.

Five groups were constituted comprising fifteen or more members each. All the groups were given different case studies either for determination of MRL of veterinary drug/pesticide/fungicide in different sector viz. meat, poultry, fish, milk, processed food where data was given or for opinions/comments over the drug having toxic profile and other parameters. These hand on exercises helped the participants in understanding the concept and issues more clearly after further discussions.

All the sessions were interactive. Various queries were made by participants in each technical session like application of OECD calculator, label claim, issue of pesticide and antibiotic residue coming from feed and soil, dealing with risk and trade when there are deviations in MRLs of Codex and exporting or importing countries, fixation of MRLs when residue is below detection limit (e.g. .005) or at .01 as per Codex, controlling illegal use of unapproved pesticides, etc. which were appropriately responded by the Canadian Experts. Finally, after detailed deliberations, some recommendations were made with consensus of experts and participants to withstand current situation and addressing future needs pertaining to fixation of Maximum Residues Levels for Pesticides, Veterinary Drugs and Antibiotics in foods.

The following recommendations emerged out of the workshop:

1. Antibiotics used in human population should be best avoided for use in food producing animals.
2. There is need to have approved label claims for pesticides, antimicrobials and veterinary Drugs to be duly authorised by the Competent Regulatory Authority.
3. As regards the processed food from agricultural commodities, there is need for fixation of MRLs as these are highly traded and concerned commodities both nationally and internationally. For this purpose, there is a need to ensure the data generation for processed food by the stake holders seeking registration of pesticides and submission to FSSAI for simultaneous fixation of MRLs along with the agricultural commodities. To arrive at exposure

levels for pesticide residues in processed foods, estimates on dietary intake to be considered while calculating MRLs.

4. National Good Aquaculture Practices should be developed to limit the usage of antibiotics and pesticides during farming operations.
5. ICAR with its network of Universities need to develop package of practises for aquaculture that restricts/regulates application of pesticides and unapproved antimicrobials.
6. A systematic and architectural change is required for approval and certification of drugs and growth supplements in aquaculture.
7. A national residue database should be created in digital platform.
8. There is a data gap regarding residues of veterinary drugs in foods originated from meat, milk and fish. Though data is available with the various research institutes, laboratories, individuals and industry, but this is in scattered form. This data needs to be collected and collated at the central level as a central repository and needs to be validated for the purpose of setting MRLs in foods. Hence, the FSSAI may initiate following action:
 - a. To start a coordinated Network Project to develop data base.
 - b. To collect data of residues of veterinary drugs from various institutes, laboratories, individuals and industry and prepare a central repository data base.
9. With the help of Drug Controller General of India (DCGI), manufacturers of veterinary drugs must submit the required data with approved method (Guidelines need to be developed) to FSSAI for fixation of MRLs in edible animal products.
10. Fodder is the major source of pesticides residues found in foods derived from animals. Hence, data on pesticides residues on the parts of crops used for fodder needs to be generated and provided.
11. National Monograph for each pesticide may be prepared for transparency.
12. Region/Zone/Sector wise workshops may be organised by the concerned sectors in collaboration with FSSAI.

Link for the Presentations held during Workshop may be seen as follows:

1. [Principles of Toxicological Hazard and Risk Assessment by Professor Len Ritter](#)
2. [Evaluating MRLs for Veterinary Drugs and Pesticide Residues by Dr. Joe Boison](#)
3. [Dietary Exposure Calculations by Dr. Joe Boison](#)
4. [Modalities of Fixation of MRLs for Pesticide Residues in Processed Foods by Dr. J Padmaja](#)
5. [Modalities for fixation of MRLs in Fish including Risk Assessment by Dr. S. K Panda](#)
6. [Modalities And Protocol For Fixation Of MRLs In Milk And Milk Products Including Risk Assessment by Dr. Aditya Jain](#)
7. [Incidence of Antibiotic and Pesticide residues in Poultry Products and Protocol for fixation of MRLs by Dr. A.M Paturkar](#)
