



Ensuring food safety in Pakistan for consumers and export markets

The challenge

Ensuring food safety is important, not only to protect the health of consumers but also to meet requirements for international trade. Many developing countries that export food internationally are increasingly aware of the need for sound food safety programmes that are in line with international standards.

In Pakistan, antimicrobials have been heavily used in animal production, and as a result, many consignments of frozen food from Pakistan to European Union countries have been sent back due to the presence of dangerous chemicals. Improper use of antimicrobials can also lead to drug resistance in the pests that the antimicrobials are supposed to destroy, which has implications for both human and animal health.

Since 2007, a ban on seafood exports from Pakistan to the European Union has led to an estimated loss

of around US\$ 47-50 million. Currently, frozen fish, shrimp shell, fish meal, fish maw and dried maws can only be exported to other countries in the region such as China, Japan, Sri Lanka and Thailand, and to the Middle East.

Pakistan needed to develop national capabilities to analyse the antimicrobial residues used – legally or illegally – in animal production, including aquaculture, by employing internationally accepted protocols and standards in a cost-effective way.

The project

In 2010, Pakistan approached the IAEA for support to establish capacity to conduct veterinary drug residue analyses in Pakistan. Through a technical cooperation project, the IAEA worked closely with the Pakistan Atomic Energy Commission and the Nuclear Institute for Agriculture and Biology (NIAB) to develop and standardize multi-analyse methods for on-site screening.



Senior Scientist performing in-house developed enzyme-linked immunosorbent assay (ELISA) for Chloramphenicol analysis in Milk.
(Photo: Mr. Imran/ NIAB)

PROJECT INFORMATION

Project No: PAK5048

Project title: Strengthening Capabilities to Monitor and Control Veterinary Drug Residues in Foodstuffs

Duration: 2012-2014 (2 years)

Budget: €208 321

Contributing to:



Partnerships and counterparts

The project was carried out in partnership with the Pakistan Atomic Energy Commission, the Nuclear Institute for Agriculture and Biology (NIAB), and the National Institute for Biotechnology and Genetic Engineering.

Facts and figures

- Pakistan's first laboratory for testing residues of chemicals used in animal production was launched.
- The analytical techniques used at the laboratory received ISO/IEC 17025 accreditation.
- Human resources were developed: nine scientists received training in residues analysis and in managing testing laboratories; three national in Pakistan institutions (Nuclear Institute for Agriculture and Biology, National Institute for Biotechnology and Genetic Engineering and the Ministry of National Food Security and Research) benefited.
- Around 300 farmers were trained on proper production practices, based on the reliable test results generated by the laboratory and made available to end users.

The science

Nuclear and isotopic analytical techniques add great value to testing and calibration laboratories such as the food safety laboratory at NIAB. Stable isotopes (forms of the same element that differ in mass) are used to improve method robustness and precision and therefore reliability.

Radiotracers are also used in food safety laboratories, where drugs intentionally labelled with carbon-14 or tritium (H-3) are used as standards or references to determine if residues are present in a food sample. Such residues may result from the use of substances such as veterinary drugs to treat or prevent/control diseases and pests in animals. Through a reliable analytical process, the labelled standards help the analyst determine if a residue is present in the food, and to estimate the concentration level or range. These techniques complement other conventional techniques.

The IAEA technical cooperation programme, in collaboration with the FAO/IAEA Joint Division, provided operational and technical support, including on-site visits. Analytical instrumentation and laboratory materials were procured to facilitate radio-receptor assay and related measurements of a range of veterinary antimicrobial agents. Human resources were developed at NIAB and its sister institute the National Institute for Biotechnology and Genetic Engineering (NIBGE), via scientific visits and fellowships in the laboratories of other IAEA Member States.

The impact

With IAEA support, a food safety laboratory was established at NIAB which is now fully operational. This first veterinary residue laboratory, inaugurated in 2017 by the IAEA Director General, Mr Amano, is now testing foodstuffs according to international standards. In 2017, the laboratory earned International Organization for Standardization (ISO/IEC 17025) accreditation. Such a measure of competence is expected to reassure consumers of the safety of local meat products and therefore to boost their export. This is a key achievement, as the livestock sector accounts for 12% of Pakistan's gross domestic product. Testing services for veterinary drug residues are now available to the private sector, and an integrated, cost-effective, achievable analytical strategy to monitor and control antibiotics residues is in place.

Advanced, integrated and cost-effective analytical methodologies in NIAB and NIBGE have been established, covering both local and exportable foodstuffs. Over 1000 samples can be analysed each year, and the scope of contaminants analysed has expanded recently to include mycotoxins: food contaminants arising from the growth of moulds in foods. This can occur when foods are still in the field or during storage and shipping.

Finally, the food safety laboratory is enabling NIAB to educate farmers about good food production practices. This will ensure that consumers are protected, and that agricultural foodstuffs are of greater monetary value.