



Keeping Northern Ireland's Food Safe

Dr Alastair Douglas

Overview

- q Relevance of the Agri-food industry in Northern Ireland and the importance of food safety
- q What does AFBI do to ensure the safety of Northern Ireland food
- q What state of the art technologies are AFBI applying to food safety



- q The agri-food sector is vitally important to the Northern Ireland economy and recognised as such by its prominence in both the Programme for Government and the Northern Ireland Economic Strategy
- q Gross turnover of the Northern Ireland food and drinks processing sector is estimated at £4.77 billion *
- q The industry is Northern Ireland's largest employer (48,000 in farming and 27,500 in food and drink processing) *
- q Northern Ireland is a net exporter of its agrifood produce



* DARD – Statistical Review of Northern Ireland Agriculture 2015



Health threat to Irish beef from illegal animal drugs

THE IRA and organised crime are behind a multi-million pound racket in illegal animal medicines and hormone growth promoters that jeopardise the health of who eat beef.

Some Irish market shelves in Ireland

by Liam Clarke in Belfast and Michael Durham

In high doses, or wrongly administered, the substances have been linked to cancer and hormonal problems in humans. However, many food experts consider them safe if used properly at the pre-

Banned drug found in meat

ANIMAL linked to beef

by Liam Clarke Belfast

farmers as "angel dust" or "high mixture" is fed to cattle before slaughter to reduce leaner beef and "big coats". When fed for a 10-day period, it can make a farmer by 100%.

herds get fatter more and Irish sectors are also con-

Irish officials seize more illegal clenbuterol

By ANTHONY PHELPS

Firm pin-points Angel Dust trail

AN Ulster meat firm believes it has pin-pointed the day on which Angel Dust contaminated liver was processed — and has compiled a list of supply farmers, it was revealed today.

Supermarket chain Stewarts

growth promoter clenbuterol — commonly known as Angel Dust. A spokesman for the

clenbuterol, a beta 2-agonist, is a drug used to treat respiratory problems in beef cattle if used properly.

the heart of his parliamentary constituency. Irish veterinary drugs specialists are now warning consumers of the health risks.

Store's meat test 'negative'

By FIONA MCGARRY

TESTS for the illegal substance Angel Dust on meat from Stewarts Supermarkets have proved negative, it was revealed today.

Meat was sent for testing after Angel Dust or clenbuterol was found in a packet of liver bought at a Belfast Stewarts' store. The Department of Agriculture carried out the tests after ITV's The Cook Report have shown tomorrow night, claimed to have found traces of the banned substance in the liver. The Department confirmed that the liver

Salmon in shops to be tested for pesticide

the market as well as the liver

'Contaminated'

A statement from the company said the programme had claimed the liver contained clenbuterol to a level of 4.9 N/E/G. This was subsequently revised by further testing by the Department to 1.9 N/E/G — well below any risk to public health.

"On receiving the information from the programme producers, Stewarts immediately

The company said Supermarkets take any how isolated, of illegal substances product extremely seriously and are up the matter with the supplier and the Department of Agriculture.

Run with illegal drug

HORSE MEAT IN

Supermarket apologises after food watchdog's findings

β Agonists put meat in the limelight again

Illicitly used clenbuterol, a β agonist, has been blamed for outbreaks of food poisoning in 135 Spaniards who ate bovine liver (Lancet, 24 November, p 1311). The illness—muscle tremors, palpitation, and myalgia lasting for about 40 hours—was mild and no one



Reg EC 37/2010

Dir 2009/8/EC

Health threat to Irish beef from illegal animal drugs

Reg EC 396/2005

Reg EC 882/2004

Dir 96/22/EC

Dir 2006/130/EC

by Liam Clarke in Belfast and Michael Durham

In high doses, or wrongly administered, these substances have been linked to heart and hormonal problems in humans. However, many food experts consider them safe if they are used at the pre-

Supermarket apologises after food watchdog's findings

Dec 2011/163/EU

Reg EC 270/2012

Dec 2005/34/EC

Reg EC 178/2002

Irish officials seize more illegal clenbuterol

Reg EC 1950/2006

By ANTHONY PHELPS

Firm pin-points Angel Dust trail

Reg EC 852/2004

Reg EC 124/2009

Dir 2002/32/EC

Reg EC 854/2004

Reg EC 853/2004

Reg EC 1831/2003

Reg EC 470/2009

Reg EC 183/2005

Dir 90/167/EEC

Dec 2002/657/EC

Reg EC 1881/2006

Reg EC 504/2008

Dec 2002/63/EC

Reg EC 122/2013

Dec 97/747/EC

Dec 98/179/EC

Dir 96/23/EC

Banned drugs found in meat

Store's meat test 'negative'

Salmon in shops to be tested for pesticides

Run with illegal drug



Reg EC 37/2010

Dir 2009/8/EC

Reg EC 882/2004

Reg EC 396/2005

Dir 96/22/EC

Dir 2006/130/EC

Dec 2011/163/EU

Reg EC 270/2012

Dec 2005/34/EC

Reg EC 178/2002

Reg EC 1950/2006

Reg EC 852/2004

Reg EC 124/2009

Dir2002/32/EC

Reg EC 854/2004

Reg EC 853/2004

Reg EC 1831/2003

Reg EC 470/2009

Reg EC 183/2005

Dir 90/167/EEC

Dec 2002/657/EC

Reg EC 1881/2006

Reg EC 504/2008

Dec 2002/63/EC

Reg EC 122/2013

Dec 97/747/EC

Dec 98/179/EC

Dir 96/23/EC



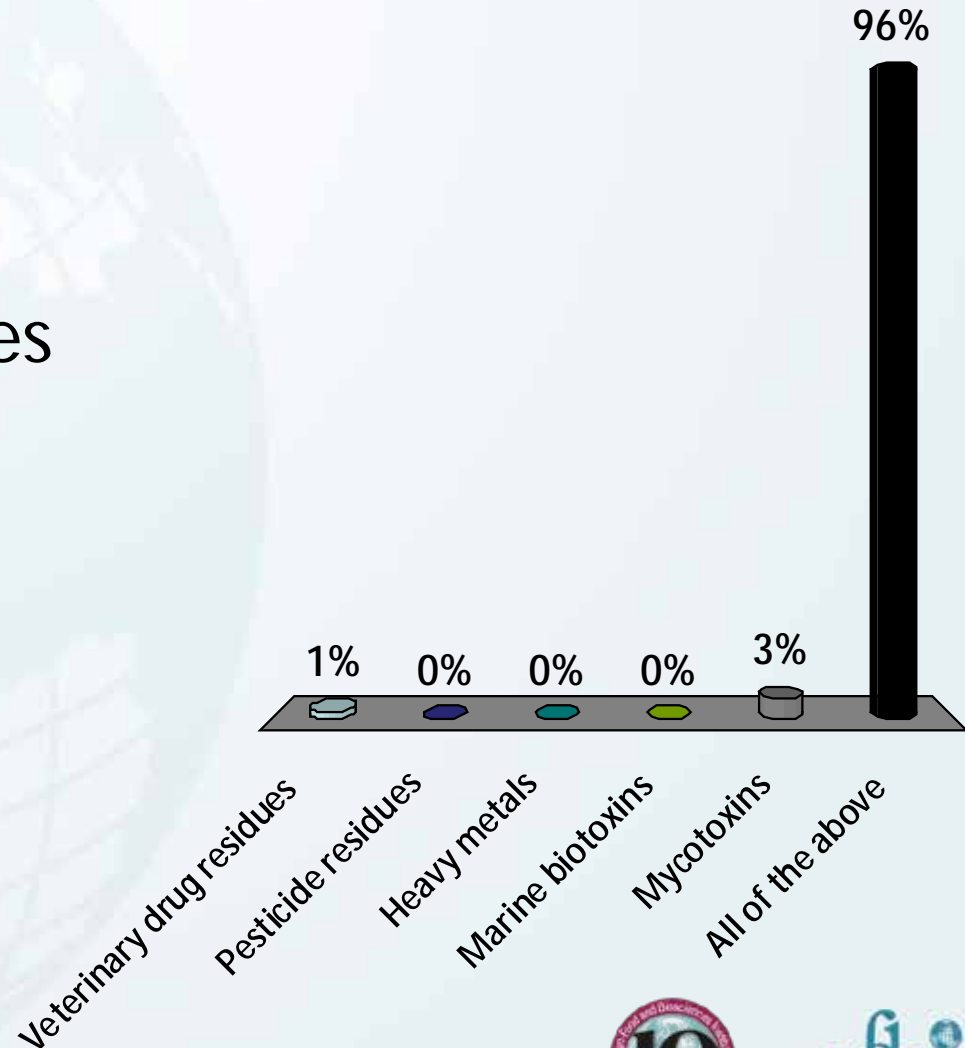
What is AFBI's role in food safety?

- q AFBI undertakes all of the statutory chemical contaminants testing of food and feedingstuffs in Northern Ireland
- q This testing is undertaken on behalf of the Department of Agriculture, Environment and Rural Affairs (DAERA), the Food Standards Agency (FSA) and the Chemical Regulations Directorate (CRD) as part of the Northern Ireland and UK official controls on food and feedstuffs
- q These official controls ensure that our food chain is free from harmful chemical substances
- q AFBI provide an emergency response to assist government in dealing with food safety issues involving chemical contaminants
- q AFBI ensures that the statutory programmes are complemented by R&D ensuring that test methods are state of the art and providing evidence for policy decisions
- q AFBI provides commercial analytical chemistry services to the Northern Ireland agri-food sector



What exactly do AFBI test for ?

- A. Veterinary drug residues
- B. Pesticide residues
- C. Heavy metals
- D. Marine biotoxins
- E. Mycotoxins
- F. All of the above



Statutory Testing Schemes

q National Surveillance Scheme

- Programme of stratified random sampling of a percentage of livestock and their products
- Part of the wider UK National Plan (Directive 96/23/EC)
- Testing for veterinary drug and pesticide residues, heavy metals and mycotoxins



Statutory Testing Schemes

q National Surveillance Scheme

q Meat Inspection Scheme

- Slaughterhouse sampling, selected by plant veterinarian
- Carcass detained pending lab results
- Rapid analysis - "Fast Track"



Statutory Testing Schemes

- q National Surveillance Scheme
- q Meat Inspection Scheme
- q RISK Scheme
 - A new scheme introduced in 2015.
 - Based on recommendations from reports from DARD and AFBI
 - Flexible risk based targeting based on knowledge, evidence (historical and current) and risk.
 - Cattle, sheep, pigs, poultry, eggs, milk



Statutory Testing Schemes

- q National Surveillance Scheme
- q Meat Inspection Scheme
- q RISK Scheme
- q Feedingstuff testing



- Undertaken on behalf of DAERA
Agri-food Inspection Branch (AfIB)
- Required under EU Dir 2002/32/EC
- Analysis of medicated and unmedicated feeds
- Veterinary drug and pesticides residues, mycotoxins, heavy metals



Statutory Testing Schemes

- q National Surveillance Scheme
- q Meat Inspection Scheme
- q RISK Scheme
- q Feedingstuff testing
- q Shellfish monitoring
 - Part of a UK wide programme
 - AFBI undertakes all Northern Ireland statutory testing for diarrhoeic, amnesic and paralytic marine biotoxins (DSP, ASP, PSP)
 - Oysters, mussels, clams



Statutory Testing Schemes

- q National Surveillance Scheme
- q Meat Inspection Scheme
- q RISK Scheme
- q Feedingstuff testing
- q Shellfish monitoring
- q Pesticide Residues in Food



- Testing of meat and shellfish shop produce for a range of pesticides on behalf of CRD to comply with EU Dir 2002/63/EC
- AFBI have been designated as an Official Laboratory by CRD



Statutory Testing Schemes

q Sample numbers tested under the various schemes

	Vet Residues	Pesticides	Heavy Metals	Mycotoxins	Marine Biotoxins
National Plan	3,500	240	90	20	
Meat Inspection	1,800				
RISK Scheme	1,200				
Feedingstuffs	310	70	240	170	
Shellfish Monitoring					400
Pesticides in Food		216			

* Figures from 2016/17 work programme



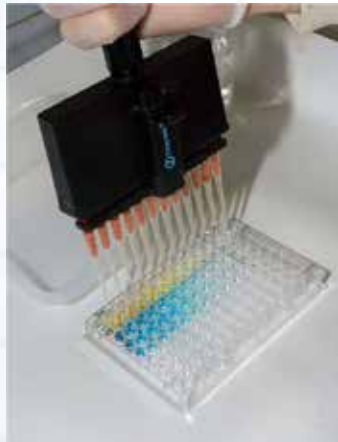
What do we test for ?

- q Veterinary Drug Residues
 - Antimicrobials, antiparasitics, amphenicols, coccidiostats, β -Agonists, Nitrofurans, Nitroimidazoles, NSAIDS, Quinoxalines, Thyrostats, Corticosteroids, Gestagens, Steroids, Tranquillisers, Veterinary drugs in feedingstuffs
- q Pesticides
 - organochlorine pesticides (eg DDT) & polychlorinated biphenyls (PCBs), organophosphates, pyrethroids
- q Marine biotoxins
 - diarrhoeic toxins (DSP), amnesic toxins (ASP), paralytic toxins (PSP)
- q Heavy metals
 - Pb, Hg, Cd, As
- q Mycotoxins
 - Aflatoxin B1 & M1

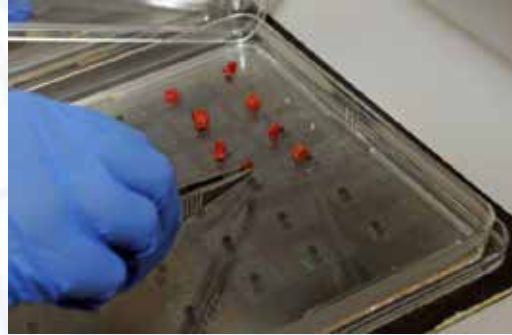


Analytical methods

Microbiological inhibition



ELISA



Mass Spectrometry



Biosensor

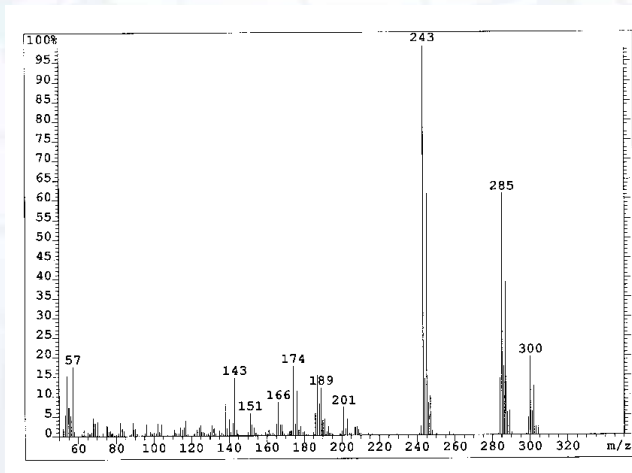


HPTLC

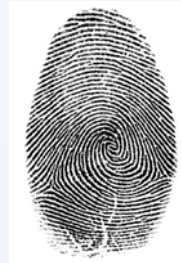


Mass Spectrometry Methods

- Historically, chemical residues testing was very much 1 method 1 compound, even with mass spec methods



=



- As instrumentation has developed, so dramatic improvements have been made in terms of increased sensitivity, data acquisition and computing power



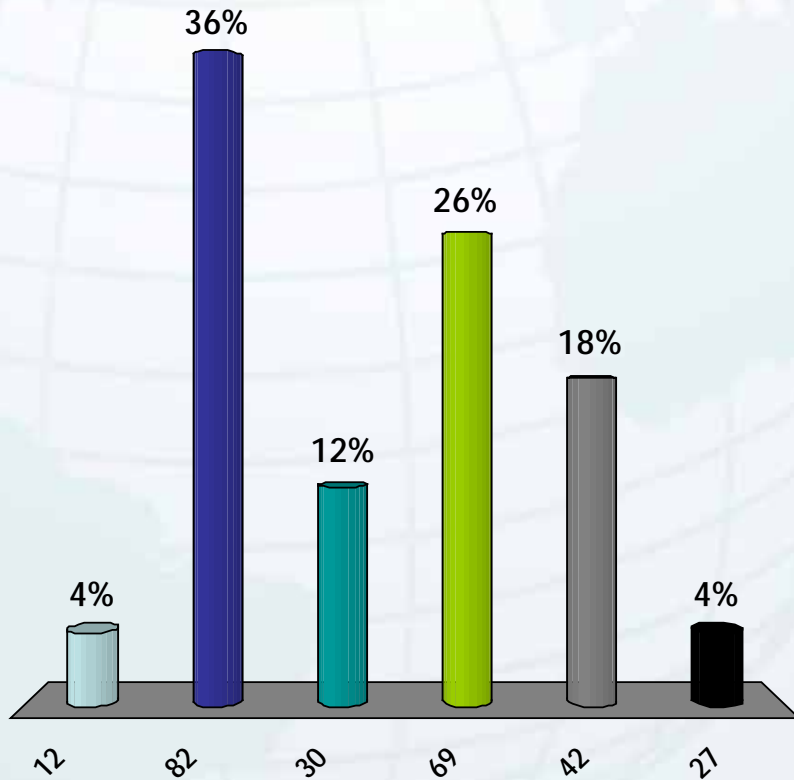
Mass Spectrometry Methods

- q AFBI have invested significantly over the recent years in ensuring that mass spectrometry instrumentation we have available for chemical residue detection is state of the art and capable of meeting national and international testing requirements now and going forward
- q The developments in instrumentation have enabled the transition from the 1 method 1 analyte through to multi-residue and now multi-class methods



Q : Multi-analyte methods

What do you think is the maximum number of different chemical compounds AFBI can detect in a single mass spec analysis ?



A. 12

B. 82

C. 30

D. 69

E. 42

F. 27



What do you think is the maximum number of different chemical compounds AFBI can detect in a single mass spec analysis ?

Answer = D = 69



Multi-analyte methods

Class of Compounds	Group	Number of analytes in multi-analyte method
Antiparasitics	Benzimidazoles; imidazothiazoles; organophosphorus anthelmintics; flukicides and macrocyclic lactones	40
Beta-Agonists	Beta-Agonists	30
Steroids	Anabolic steroids & natural steroids	27
Veterinary drugs in feeding stuffs	Veterinary drugs in feeding stuffs	42
Pesticides	Organochlorine Pesticides & Polychlorinated Biphenyls	28
Pesticides	Pesticides & Organic contaminants.	69



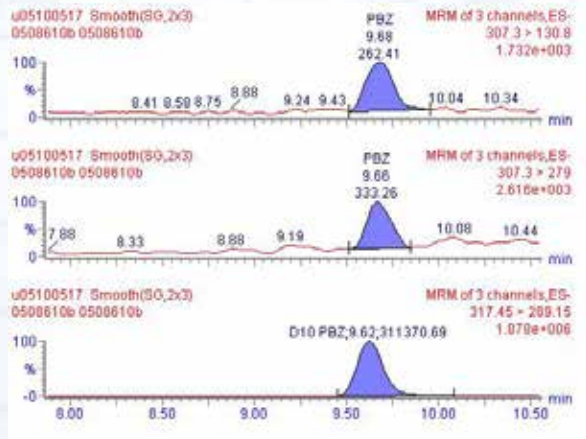
Multi-analyte methods

Class of Compounds	Group	Number of analytes in multi-analyte method
Antiparasitics	Benzimidazoles; imidazothiazoles; organophosphorus anthelmintics; flukicides and macrocyclic lactones	40
Beta-Agonists	Beta-Agonists	30
Steroids	Anabolic steroids & natural steroids	27
Veterinary drugs in feeding stuffs	Veterinary drugs in feeding stuffs	42
Pesticides (feeds) (kidney fat, eggs, milk)	Organochlorine Pesticides & Polychlorinated Biphenyls	28
Pesticides (kidney fat, eggs, milk)	Organochlorine Pesticides & Polychlorinated Biphenyls	69

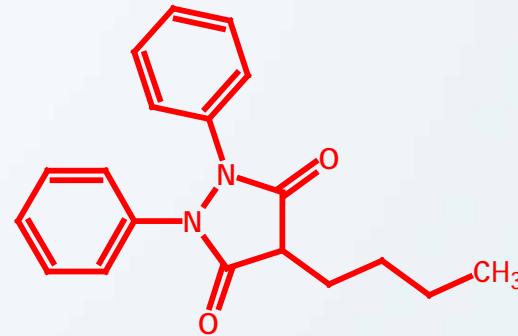


Test Method Sensitivity

- As instrumentation has improved so sensitivity and specificity have increased.



=



- The mass spec instrumentation and methods AFBI currently utilise enable extremely small amounts of drug residues to be detected



Phenylbutazone

- ❑ A non-steroidal anti-inflammatory drug (NSAID), PBZ, often called “Bute”
- ❑ Used in human medicine for treatment of rheumatoid and arthritic disorders
- ❑ Induces disorders of the blood including aplastic anaemia
- ❑ No longer licensed for use in humans
- ❑ Used to treat horses since the 1950s
- ❑ PBZ is not permitted for use in any food producing animal
- ❑ As an unauthorised drug there is no maximum allowable residue limit for PBZ ie the drug residue should be absent in tissues/products of food producing animals



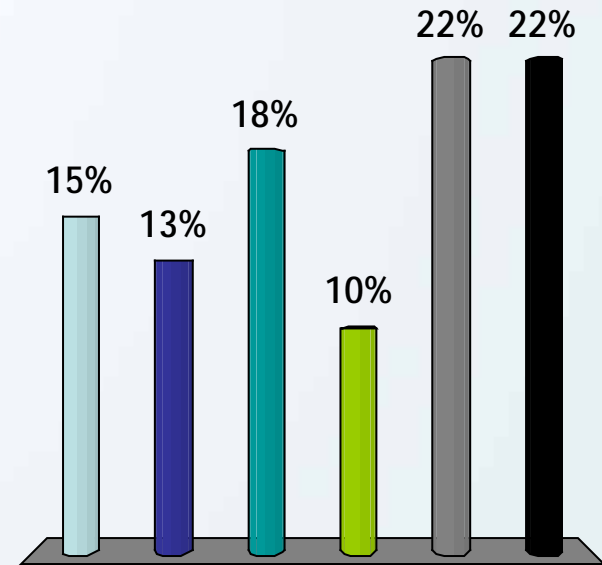
Phenylbutazone

- q AFBI have developed a highly sensitive mass spec method for the detection of PBZ in plasma or urine
- q For the unauthorised drugs, the goal for any test method is to have a decision limit as close to zero, within the restrictions imposed by uncertainty in the measurements that are made
- q The decision limit for the AFBI method is 0.28ng/ml, which is extremely good



Q : How sensitive is the AFBI method ?

- A. Identifying 200,000 people in the total world population
- B. Identifying 2,000 people in the total world population
- C. Identifying 200 people in the total world population
- D. Identifying 20,000 people in the total world population
- E. Identifying 2 people in the total world population
- F. Identifying 20 people in the total world population

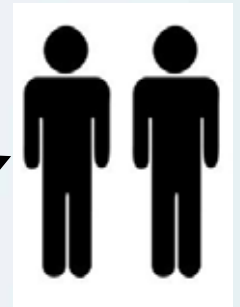


Identifying 200,000 people in the total world population
Identifying 2,000 people in the total world population
Identifying 200 people in the total world population
Identifying 20,000 people in the total world population
Identifying 2 people in the total world population
Identifying 20 people in the total world population



Q : How sensitive is the AFBI method ?

ANSWER = E = 2 People



Quality and Reputation

- Quality of our work and our national/international reputation are extremely important to what we do



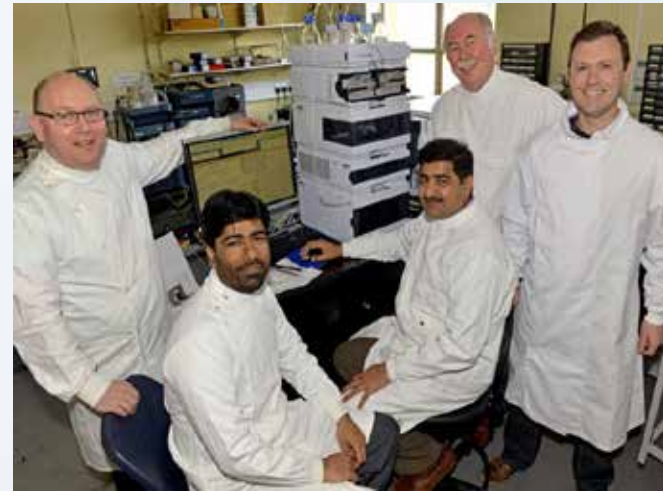
Quality and Reputation

- Quality of our work and national/international reputation are extremely important to what we do
- Quality of our work
 - Test methods are validated and accredited to ISO 17025, as required by official controls legislation (EC882/2004)
 - Flexible Scope accreditation to enable rapid response to new challenges/threats



Quality and Reputation

- Quality of our work and national/international reputation are extremely important to what we do
- International Reputation
 - UK National Reference Laboratory for illegal veterinary drugs
 - UK National Reference Laboratory for marine biotoxins
 - Participation in EU meetings and decisions
 - Visits and training of international scientists



Summary

- q AFBI provide all of the testing for Northern Ireland underpinning statutory safeguards in terms of food and feedingstuffs for veterinary drug residues, pesticides, chemical contaminants, mycotoxins and marine biotoxins
- q AFBI are the National Reference Laboratory for banned veterinary drugs and marine biotoxins
- q We have a high international reputation, primarily based on our technical competence
- q AFBI has state of the art equipment and test methods available, capable of providing current and future requirements for chemical contaminant food safety
- q The statutory programmes AFBI are involved with are underpinned by R&D, delivering test method improvements and policy evidence
- q AFBI provides an emergency response for dealing with food and feedstuff contamination in Northern Ireland



Thank You



"Okay—who put my lunch through the mass spectrometer..?"

