

## Disease Surveillance and Investigation Branch

### Northern Ireland Disease Surveillance Report January to March 2010

- Insulin-dependent diabetes mellitus in a yearling bull persistently infected by BVDV
- High levels of liver fluke infection reported in cattle and sheep
- Bilateral congenital cataract in a calf
- Fungal pneumonia in a Harris hawk
- 'Wobbly hedgehog syndrome' in a pygmy hedgehog

These are among matters discussed in the Northern Ireland animal disease surveillance quarterly report for January to March 2010.

#### CATTLE:

##### Respiratory diseases

Respiratory disease was identified in 109 cattle postmortem submissions between January and March 2010. The most common pathogens identified included *Mannheimia haemolytica* (17 cases), *Arcanobacterium pyogenes* (12 cases), *Mycoplasma bovis* (12 cases), *Pasteurella multocida* (11 cases), infectious bovine rhinotracheitis virus (IBRV) (seven cases) and *Histophilus somni* (three cases).

Numerous adult lungworms were seen in the trachea of a respiratory tract submitted from a four-year-old cow that died in January. Lobular pneumonia was also present. Several cows in the herd had been coughing since being housed the previous October and three other cows had died within the previous six weeks.

A one-month-old calf died suddenly. On postmortem examination fibrinopurulent pleurisy, pericarditis and peritonitis were present. *M. haemolytica* was isolated in a septicemic pattern from the viscera.

##### Alimentary diseases

##### BVDV / Mucosal disease

Of 920 blood samples that were tested for

bovine viral diarrhoea virus (BVDV) by virus isolation or antigen capture ELISA 105 (11.3 per cent) were positive. In addition, 17 of 422 (4.0 per cent) submitted tissues and nasal mucus samples were positive by immunofluorescence. Eight cases of mucosal disease were confirmed at postmortem examination during the quarter.

At postmortem examination of an eight-day-old calf the lower small intestine, caecum and colon were found to be obstructed by dry hard pale-coloured contents, and the upper part of the gastrointestinal tract was distended with fluid contents. No significant bacteria were isolated, and the diagnosis was intestinal ileus.

At postmortem examination of a four-year-old bull the cause of death was found to be exsanguination into the intestine. The haemorrhagic focus was limited to the mid-jejunum, where the mucosal lining had sloughed, exposing the submucosal vasculature. The blood clot in the lumen was tightly adherent to the submucosa for 15 cm caudal to the origin of haemorrhage, and thereafter the clot was not attached to the intestinal mucosa. BVDV antigen was demonstrated by immunofluorescence in the jejunal wall.

At postmortem examination of an eight-month-old heifer the carcass was found to be pale, thin and anaemic, with excess clear fluid in the abdomen and marked mesenteric oedema. The liver was enlarged, pale and very firm in texture, with a nodular surface. Histologically, there was severe periportal and bridging fibrosis with biliary hyperplasia, marked fibrous thickening of the bile duct walls, leucocytosis, marked subcapsular fibrosis, and disorganisation of hepatic sinusoids with vacuolation evident in some hepatocytes. The gall bladder was markedly distended and contained over 200 liver fluke, with very numerous fluke eggs. Numerous paramphistomes were

found amongst the villi in the rumen, but no paramphistome eggs were found in the faeces, indicating that this infection was pre-patent.

A 13-year-old cow had been ill for ten days prior to death. It had been treated for a possible stomach ulcer. The cow had died from a perforated rumen and subsequent peritonitis. The rumen was markedly distended and there was a severe necrotising rumenitis with full depth necrosis, thrombosed vessels and degenerate inflammatory cells. The omasum was distended and there were multiple large holes in the omasum leaves with healed margins. It was considered that the likely initial cause was carbohydrate overload and ruminal acidosis.

A yearling heifer died after showing respiratory distress and swelling under the jaw. Another animal had also died after showing similar respiratory signs. On postmortem examination

there was a chronic fibrosed lesion on the dorsum of the tongue and a small fibrotic tract extending from this lesion into the deep tissues. This tract contained fragments of foreign material which appeared to be wood. The tract extended into the submandibular tissues and, from this, a large area of necrosis and abscessation extended past the pharynx and into the left neck. Pressure from this abscess onto the larynx and trachea would have been responsible for the respiratory distress and death. This was an unusual foreign body incident particularly as the pattern of necrosis and abscessation was very similar to that seen in dosing gun injuries.

#### Neonatal enteritis

The pathogens identified in neonatal bovine faecal samples during the quarter are shown in Table 1. Overall, *Cryptosporidium* species and rotavirus were the most common pathogens identified.

Table 1: Pathogens identified in neonatal bovine faecal samples in Northern Ireland, January to March 2010.

Pathogen	Number	
	Tested	Positive (%)
<i>Cryptosporidium</i> species	824	319 (38.7%)
Rotavirus	803	255 (31.8%)
Coronavirus	801	63 (7.9%)
<i>Escherichia coli</i> K99	388	5 (1.3%)

Table 2: Endoparasitic infections in ruminants in Northern Ireland, January to March 2010.

	No of parasitic ova						% positive
	Total	Negative	+	++	+++	++++	
<b>Liver fluke</b>							
Bovine	722	577	102	39	2	2	20.1%
Ovine	179	114	23	21	12	9	36.3%
<b>Paramphistome</b>							
Bovine	629	375	100	115	26	13	40.4%
Ovine	138	108	14	10	3	3	21.7%
<b>Coccidia</b>							
Bovine	954	806	106	22	8	12	15.5%
Ovine	219	153	45	8	4	9	30.1%
<b>Strongyle worm egg count</b>							
		<500 epg	≥500 epg				
Bovine	748	722	26				3.5%
Ovine	184	126	58				31.5%

≥ 500 eggs per gram of faeces (epg) was considered of likely clinical significance

+ Low, ++ Moderate, +++ High, ++++ Very high

### Other enteric conditions

Parasitic ova found in ruminant faeces samples submitted during the period are shown in Table 2.

### Johne's disease

Examination for *Mycobacterium avium* subspecies *paratuberculosis* (MAP) was carried out by microscopic examination, with Ziehl-Neelsen staining, on 315 bovine faecal samples. Nine samples (2.8 per cent) contained acid-fast organisms typical of MAP. A total of 4340 bovine blood samples were tested for antibodies to MAP, of which 274 samples (6.3 per cent) were positive.

### Nutritional and metabolic diseases

A one-year-old pedigree beef bull was submitted with a history of ketosis and suspected fatty liver. At postmortem examination the liver was tan-coloured and friable and there were multiple haemorrhagic ulcers in the abomasal mucosa. BVDV was detected in the spleen and abomasum by immunofluorescence. Moderate levels of ketones and high levels of glucose were detected in the urine suggestive of ketoacidosis secondary to diabetes mellitus. Spontaneous insulin-dependent diabetes mellitus has been reported in young cattle which are persistently infected by BVDV (VR, March 6, 1999, vol. 144, p268-269).

### Reproductive and mammary diseases

#### Abortion

Specimens from 198 bovine abortions and stillbirths were examined during the quarter. Significant pathogens were detected in 111 cases (56.1 per cent). Of these, *Leptospira Hardjo* (29 cases, 14.6 per cent) was the most commonly identified pathogen. Other pathogens identified included: *A. pyogenes* (23 cases, 11.6 per cent), *Bacillus licheniformis* (20 cases, 10.1 per cent), *Neospora caninum* (14 cases, 7.1 per cent), *Escherichia coli* (10 cases, 5.1 per cent) and BVDV (9 cases, 4.5 per cent).

#### Mastitis

A total of 682 bacterial isolates were cultured from milk samples submitted from acute and chronic mastitis cases. Sixty-five (8 per cent) samples yielded cultures of more than two organisms and were considered to be potentially contaminated. No

bacteria were cultured in a further 94 samples. *E. coli* was the most frequently isolated organism and accounted for 16.9 per cent of isolates cultured. Other frequently identified organisms included:

*Streptococcus uberis*, (14.1 per cent), *Staphylococcus aureus* (12.6 per cent), other *Streptococcus species* (10 per cent), *Enterococcus species* (4.7 per cent), other *Staphylococcus species* (7.3 per cent), *Pseudomonas species* (4.3 per cent), *Streptococcus dysgalactiae* (4.1 per cent), *Aerococcus species* (4.1 per cent), *Bacillus licheniformis* (3.7 per cent) and *A. pyogenes* (2.8 per cent).

### Neurological diseases

A two-year-old Friesian heifer, carrying a near term foetus, was submitted for postmortem examination in late March. The heifer had been found recumbent in a slatted shed the previous day and had been treated with magnesium, calcium, an anti-inflammatory/analgesic drug and an antibiotic. Failure to respond to treatment led to euthanasia on welfare grounds. On postmortem examination a fracture of the left lateral aspect of the first cervical vertebra with associated free bone fragment and abscessation was seen. Histology indicated that the abscess had invaded the meningeal space. The Veterinary Sciences Division notes that this is an unusual differential diagnosis that should, nonetheless, be borne in mind when examining downer cows.

### Other diseases

Vegetative endocarditis affecting the aortic valve was seen on postmortem examination of a six-month-old calf, which had been receiving treatment for pneumonia. There was also focal suppurative myocarditis in the left ventricle.

Vegetative endocarditis and coronary thromboembolism was diagnosed in a three-year-old cow, which had presented during the previous month with shifting lameness, dyspnoea and a possible heart murmur. There was vegetative endocarditis of both the right and left atrioventricular valves and a swollen branch of the coronary artery was obstructed by a pale thromboembolus.

At postmortem examination of a two-week-old calf the rumen was found to be filled with

yellow, frothy fermentative contents, but there were no other gross abnormalities. *Klebsiella oxytoca* was isolated in large numbers and in a septicaemic pattern. This microorganism has been recorded previously as an uncommon cause of septicaemia and meningitis in young calves. Negative results were obtained for rotavirus, coronavirus, *Cryptosporidium* and *E. coli* K99 infections.

A six week old calf was submitted for investigation with a history of pyrexia, respiratory signs; despite treatment, it became recumbent and was euthanased. At gross postmortem examination there was fibrin and excess fluid in the atlanto-occipital, stifle and hock joints. A copious amount of fluid was present within the calvarium, with enlargement of the cerebral ventricles. Histologically there was a suppurative meningio-encephalitis with malacia and abscess formation in fore, mid and hind brain. A profuse culture of *Salmonella* Dublin was recovered from the brain.

A weak one-day-old calf was euthanased. Liver rupture with intrahepatic haemorrhage was seen on postmortem examination. A bilateral cataract was also present (Figure 1). On histological examination there was perinuclear lens fiber degeneration with morgagnian globules, bladder cells and sporadic mineral deposition. The calf was negative for BVDV. Congenital cataract in calves is an uncommon finding which is seen following in utero BVDV infection. It has also been described with a familial inheritance in Holstein-Friesians.



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Fig 1. Bilateral cataract in a one-week-old calf

At postmortem examination of a 14-month-old bull that died suddenly an abscess was found in the pituitary gland, eroding the underlying bone and extending to the wall of the oropharynx. There was diffuse thickening of the meninges and cerebellar coning. On histological examination there were multifocal perivascular aggregates of neutrophils and macrophages and severe diffuse thickening of the meninges with eosinophilic proteinaceous oedema, neutrophils and macrophages. Adjacent to the pituitary there was a large, well demarcated, encapsulated abscess composed of degenerate neutrophils centrally with bacterial colonies, surrounded by neutrophils, macrophages and fibrosis.

Two six-year-old cattle were submitted for postmortem examination from a yard where the cattle had access to a paddock and shed. The group were fed at 8.30 am and were apparently fine, but the farmer found a bull and a cow dead, lying separately, two hours later. At postmortem examination both animals had petechial haemorrhages in the tracheal mucosa and the bull had epicardial haemorrhages. A corroded piece of wire was entrapped in a fibrous track in the reticular wall of the cow, but there was no serosal reaction or evidence of penetration through the serosa. No toxic material was detected in the rumen. The possibility of electrocution was discussed with the practitioner. The farmer later confirmed that the electricity board had discovered stray voltage in the shed.

## SHEEP:

### Respiratory diseases

Respiratory disease was identified in 28 ovine postmortem submissions during this quarter. Jaagsiekte (10 cases), *Mannheimia haemolytica* (six cases), bronchopneumonia (six cases) and *Pasteurella multocida* (three cases) were the most common diagnoses.

At postmortem examination of a two-year-old ewe the lungs displayed 50 per cent haemorrhagic consolidation with fibrinous pleurisy and a large pale focal lesion in the cranioventral lobes. On histological examination pulmonary adenomatosis was diagnosed, with numerous foci of secondary acute toxic bronchopneumonia featuring oat-cell formation

and bacterial colonisation, congestion, alveolar and septal oedema and haemorrhage. *M. haemolytica* was isolated from the lung tissue.

### Alimentary diseases

At postmortem examination of two two-year-old ewes both were found to have severely damaged livers with numerous adult and immature fluke present. Fluke counts on the livers yielded 184 mature fluke and 564 immature fluke in one animal, while the other had 339 mature fluke and 251 immatures. This was despite regular dosing with triclabendazole throughout the risk period. This case is typical of a number that have been presented recently and highlights the growing problem of triclabendazole resistance in flocks in Northern Ireland.

Two ewes and one lamb were submitted in January 2010 from a flock which had been dosed for fluke in November, but had been experiencing losses since late December 2009. Postmortem examination revealed several hundred fluke in each animal's liver ranging in age from four weeks to adult with associated liver damage and haemorrhage.

Significant levels of *Nematodirus* and strongyle parasites were also detected in the lamb carcase. In addition there were significant numbers of adult paramphistome (stomach fluke) parasites present on the rumen mucosa of all three sheep.

### Johne's disease

Nineteen ovine faecal samples were examined microscopically using Ziehl-Neelsen staining for MAP. One sample (5.3 per cent) contained acid-fast organisms typical of MAP. Three ovine blood samples were tested for antibodies to MAP, none of which were positive.

### Reproductive diseases

Specimens from 253 ovine abortions and stillbirths were examined during the 1st quarter. Significant pathogens were detected in 161 cases (63.6 per cent). Of these, *Chlamydophila abortus* was the most commonly identified pathogen and was detected in 49 cases (19.4 per cent). Other pathogens identified included: *Toxoplasma* (38 cases, 15 per cent), *Leptospira* (27 cases, 10.7 per cent), *E. coli* (20 cases, 7.9 per cent), *Campylobacter* (16 cases, 6.3 per cent),

*A. pyogenes* (5 cases, 2.0 per cent) and *Listeria* (5 cases, 2.0 per cent).

Twin ovine foetuses were submitted for postmortem examination. No abnormalities were seen grossly. *Aspergillus fumigatus* was isolated from the stomach contents. The placenta was not submitted for examination.

Two aborted foetuses were submitted from a flock in which six other abortions had occurred within the previous two weeks. Despite regular treatment of the flock throughout the autumn and winter with an anthelmintic containing triclabendazole, there have been frequent deaths due to acute and sub-acute fluke infection, high fluke eggs counts in faecal samples and numerous cases of abortion for which no infectious cause has been diagnosed. This example is typical of many scenarios that have been reported this year, and illustrates that triclabendazole resistance in now endemic in sheep flocks in Northern Ireland, and that severe acute and subacute fluke infection frequently leads to abortion in heavily pregnant ewes because liver function is impaired to the extent that pregnancy cannot be sustained.

### Other diseases

At gross postmortem examination of three four-year-old ewes numerous leaf fragments were found in their rumen contents, indicating the possibility of plant poisoning. The leaf fragments were identified as *Pieris* species ("Forest Flame"), rhododendron and ivy. The former two plants are highly toxic for ruminants, and were considered to be the cause of death.

Poisoning due to the ingestion of large amounts of ivy was diagnosed in two 18-month-old hoggets. Four hoggets from a batch of 26 died. Although there was evidence of supplementary feeding and the rumens contained forage the snowy weather may have encouraged the hoggets to eat the ivy.

An adult full-mouthed ram was submitted for investigation with a history of dullness, respiratory stertor and fleece loss. At postmortem examination there was ascites, extensive liver damage, with fibrosis, regeneration and haemorrhagic tracts. Numerous flukes from immature to adult were detected. There was abscessation of the

left retropharyngeal lymph node and a small laminated abscess in the right lung from which *Corynebacterium pseudotuberculosis* was isolated.

At gross postmortem examination of two ewes there was evidence of enteritis and foetal death in one, while in the second the gross changes were of toxæmia/septicaemia, and a single fresh foetus of approximately three months gestation was found. *Listeria monocytogenes* was recovered in septicaemic distribution from the second animal and a scanty growth of *Listeria* was recovered from the liver of the first. Histologically, abscessation, chronic periportal hepatitis and acute focal hepatoparenchymal necrosis were noted in the liver of the first animal. Brain lesions were not seen histologically in either ewe.

## PIGS:

### Respiratory diseases

Four recently weaned piglets with a history of respiratory signs and ill thrift were submitted for postmortem examination in February from a 600-sow birth-to-bacon unit. Adult sows in the unit had shown respiratory signs and (undiagnosed) abortions several months previously. *Actinobacillus pleuropneumoniae*, *Mycoplasma hyopneumoniae* and porcine reproductive and respiratory syndrome (PRRS) had previously been detected in pigs from this unit. Sections of lung tissue were positive for influenza A virus by immunofluorescence. Influenza A-positive lung tissue samples were further tested using PCR and this identified the presence of the H1N1/09 influenza A virus. Histology of lung tissue was consistent with viral pneumonia with secondary bacterial infection. Respiratory disease in young piglets continues to be a problem on this unit, with respiratory disease now being diagnosed in unweaned piglets. A vaccination programme is in place for *M. hyopneumoniae* and PRRS.

### Other diseases

A sow that had died suddenly was submitted from a unit which had lost several sows. At postmortem examination there was torsion of the left lobe of the liver through 360 degrees, with blood clots and fibrin lying on the capsular surface.

## BIRDS:

### Poultry

Adult layers from a flock with a history of high mortality were submitted for postmortem examination. All birds had evidence of egg peritonitis and septicaemia. *E. coli* 078 was isolated in profuse growth and in a septicaemic pattern. This is a pathogenic isolate. In addition, all birds were seropositive for *Ornithobacterium rhinotracheale* (ORT), but the significance is not clear.

On gross postmortem examination of an adult Vorwerk chicken that died suddenly diffuse articular and visceral gout was detected involving the pericardium, kidney, liver, lungs and intestinal serosa. On histological examination lymphohistiocytic tubulointerstitial nephritis and gout tophi were present in the kidney.

Gout is a common disease in all bird species often caused by dehydration or renal problems. Visceral gout is more common; it is usually acute in onset and affects both male and females. It is usually due to a failure of urate excretion. Articular gout is a less common and more chronic disease with a higher proportion of males affected. It is due to defective secretion of urates by renal tubules. The combination of visceral and articular gout in this case indicates chronicity.

### Cage and aviary

On postmortem examination of a 15-week-old African Grey parrot, the carcass was found to be congested with an enlarged mottled liver and enlarged haemorrhagic kidneys. Histologically, the liver, lung and kidney tissue were congested and oedematous, and the blood vessels were colonised by very numerous filamentous micro-organisms. There were focal to confluent areas of fibrinoid necrosis in the hepatic parenchyma, but little evidence was seen of inflammation. Tests for psittacosis were negative, but a *Pasteurella* species was isolated in a septicaemic pattern, and the likely cause of death was considered to be septicaemic pasteurellosis.

On gross postmortem examination of a Harris hawk the main finding was of multifocal white-blue fungal plaques on the lungs,

airsacs, pericardium and liver capsule. On histological examination of the lung there were large multifocal aggregates of degenerate heterophils, macrophages, multinucleated giant cells and a few lymphocytes surrounding periodic acid Schiff-positive myriad branching fungal hyphae. Additionally, there were variable numbers of nematode eggs surrounded by macrophages multifocally within the parabronchial lining. *A. fumigatus* was cultured from the lungs, air sacs and liver.

Fungal pneumonia in birds is most commonly due to *Aspergillus species*. It is seen most commonly in immunosuppressed birds or birds with a concurrent pulmonary infection. The additional findings of *Syngamus trachea* eggs may be incidental or the initial trigger for *Aspergillus* growth within the lungs.

#### Wild birds

The carcase of a mute swan cob (*Cygnus olor*) weighing 7 kg was presented for postmortem examination. The swan was found in a river, was depressed and died a short time later. The swan was in poor condition and the keel bone was prominent. There was a heavy intestinal parasite burden. Large numbers of worms were detected grossly in the duodenum. The lower trachea was reddened and inflamed due to tracheal fluke and histologically fluke eggs were detected in the trachea and lung. Gizzard worms and ova were also detected histologically.

#### HORSES:

All 189 swabs that were examined for the presence of *Tayorella equigenitalis* were negative. Sixteen swabs were cultured from horses with a history suggestive of strangles, three of which were positive.

#### Alimentary diseases

An adult male horse died after an acute colic. Torsion of the ascending and descending colon with volvulus, venous infarction and caecal displacement were seen on postmortem examination. Histologically renal tubular necrosis, which is associated with hypovolaemic shock, was seen.

An adult male horse was euthanased after presenting with acute severe colic.

On postmortem examination ileal entrapment in the mesenteric fold was present.

#### Reproductive diseases

On postmortem examination of an aborted foetus the most significant finding was an excessively long umbilical cord (102 cm) with eight torsions of the cord and focally extensive petechial haemorrhages along the cord (Figure 2). There was diffuse meconium staining of the carcase.

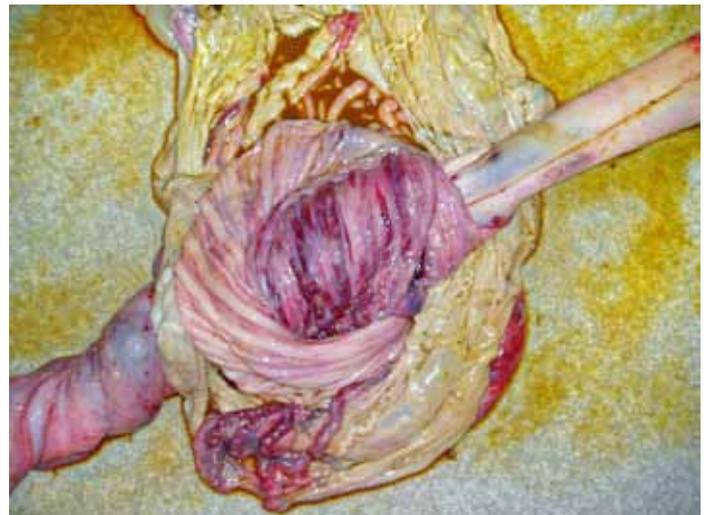


Fig 2. Torsion of the umbilical cord in an aborted equine foetus

Abortion due to umbilical torsion is common in equines and frequently associated with umbilical cords of excessive length (greater than 82 cm). A clotted blood sample from the mare was seropositive for equine herpesvirus (EHV), indicating previous exposure to this common equine virus. Immunofluorescence for EHV was negative.

#### OTHER SPECIES:

Postmortem examination of a 10-year-old vicuna revealed that the carcase was in poor condition. A severe, chronic infection of liver fluke, with associated liver fibrosis and accumulation of excess fluid in the peritoneal cavity was present. In addition, there was a significant burden of nematode parasites in the small intestine. A well-differentiated melanoma occupying the anterior chamber of the left eye, with adhesion to the cornea was also present.

On gross postmortem examination of a pygmy hedgehog a bony mass 0.5 cm in diameter was seen juxtaposed to a vertebral centrum in the mid-thoracic spine. No other gross abnormalities

were found. On histological examination there was a marked spongiform leucoencephalopathy affecting the brain and spinal cord. This change in the central nervous system is characteristic of 'wobbly hedgehog syndrome', a neuropathy of unknown aetiology affecting approximately 10 per cent of captive pygmy hedgehogs.

An adult kangaroo that had been imported from Great Britain three days previously was seen dull and was treated with antibiotics before death. On gross postmortem examination myriad small (1.5-2cm long) white worms were found within the stomach. The worms were identified as *Rugopharynx australis*. This species is a common stomach worm of grey kangaroos in Australia. It has not been previously identified either in Northern Ireland or on the premises of origin in England.

This summary has been compiled by the Veterinary Sciences Division of the Agri-Food and Biosciences Institute (AFBI\*) of Northern Ireland and is based on diagnostic submissions to AFBI's veterinary laboratories at Stormont, Belfast, and Omagh, Co Tyrone.

<http://www.afbini.gov.uk/index/services/diagnostic/adds.htm>

\*AFBI was created on 1st April 2006 as the amalgamation of DARD Science Service and the Agricultural Research Institute of Northern Ireland. AFBI operates a farm animal disease diagnostic service on behalf of the Department of Agriculture and Rural Development for Northern Ireland.