

Antimicrobials and Scottish salmonid aquaculture

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Scottish Government
Riaghaltas na h-Alba
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Scottish aquaculture production

Scottish Fish Farm Production Survey 2015						
Species	Tonnage (wet weight)			No. individuals	No. sites	No. businesses
	Table	Angling	Biological controls			
Total salmon production (table)	171722				254	16
Salmon smolts (FW)				44.6 million	87	25
Salmon ova (FW)				68.2 million		
Rainbow trout (SW) table	4678				24	45
Rainbow trout (FW) table	3355	555				
Rainbow trout ova (FW)				12.12 million		
Brown trout (FW) angling		42			14	18
Halibut (SW)	56				2	3
Lumpsucker (SW)			6	235,000	4	4
Wrasse (SW)			3	75,000	3	4



FW: freshwater, SW: seawater

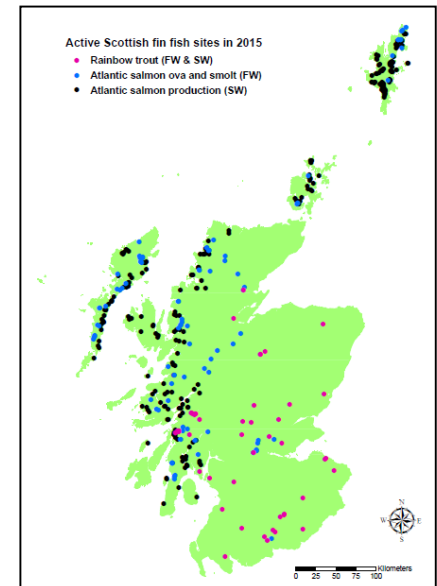
Wet weight: weight of live fish at harvest

Marine Scotland Science, Scottish Fish Farm Production Survey (2015), ISBN : 978-1-78652-427-0: www.scotland.gov.uk.



Salmon

- 1st producer of salmon in the EU, 3rd in world (after Norway and Chile)
- 1/3 of all Scottish food exports
- 2nd food export after whisky (in value)



UK (outwith Scotland) aquaculture production

UK aquaculture production survey 2012 (Tonnage)							
Country	Species	Table	Ongrowing	Release to wild	Ornamental	Species total	No. businesses
England	Rainbow trout (FW)	3,775	2220.4	2113.9		8109.2	109
	Brown trout (FW)	32	19.5	266.7		318.2	
	Common carp (FW)	5	15.8	112.2		133.0	67
	Tilapia (FW)	101.8				101.8	28**
	Others (14 species)	7.8	9.9	28	0.8	46.6	
Wales	Rainbow trout (FW)	102.5		145.4		247.8	23
	Brown trout (FW)	0.1		14.4		14.5	
	Brook trout (FW)			0.3		0.3	
	Sea bass (FW)	190.0				190.0	1
Northern Ireland	Rainbow trout (FW)					563.2	20
	Brown trout (FW)					44.4	
	Atlantic salmon (SW)					c*	1

FW: freshwater, SW: seawater; c* commercially sensitive due to only single farm producing fish

**In addition, 36 ornamental/importers in England and 2 ornamental/importers in Wales

CEFAS: Ellis *et al.* (2012), *Aquaculture statistics for the UK, with a focus on England and Wales 2012*:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/405469/Aquaculture_Statistics_UK_2012.pdf



CEFAS report 2012



Antimicrobial control in Scottish Aquaculture

UK authorised antimicrobial agents for fish

- Oxytetracycline (ERM and furunculosis)
- Amoxicillin
- Florfenicol (furunculosis)

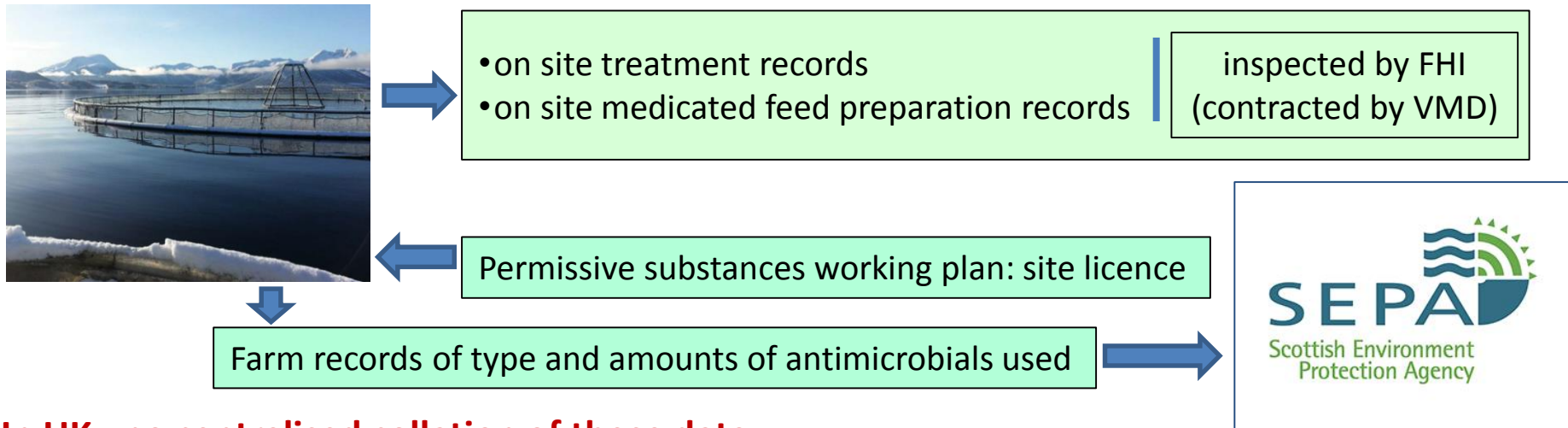
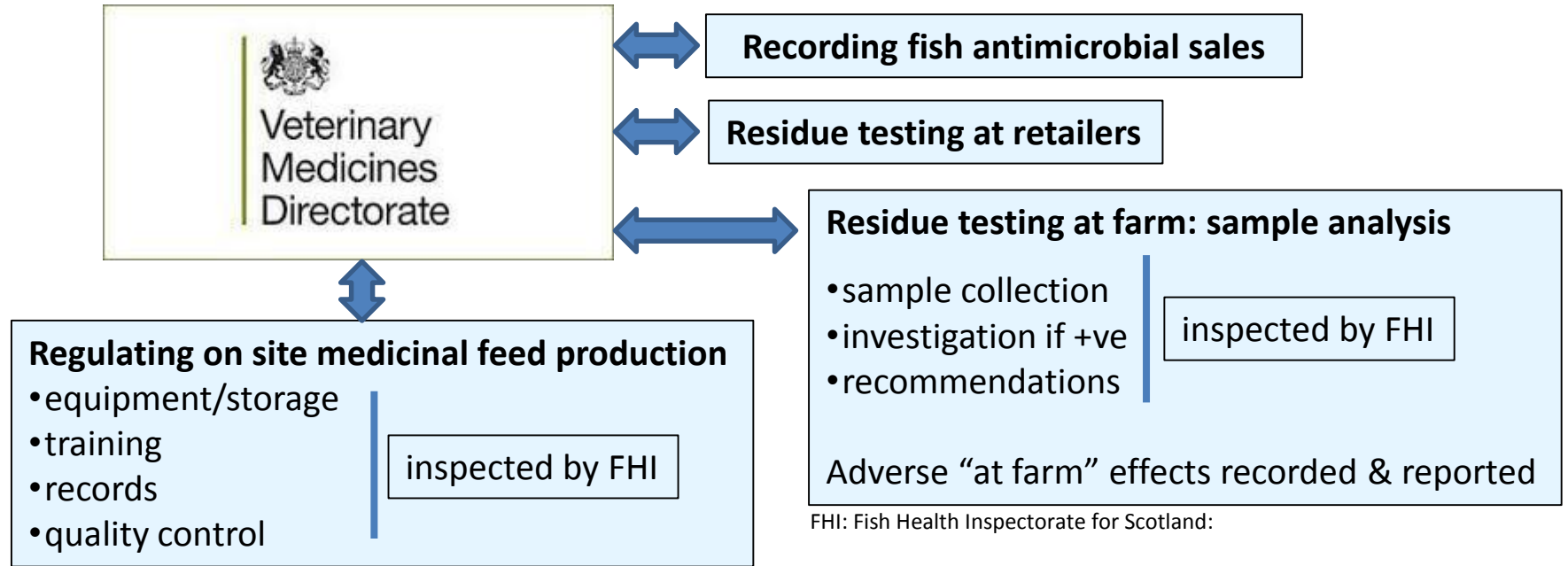
Cascade system

- alternative antimicrobials prescribed
- priority system
- longer withdrawal time often required

- antibiotics only administered under a veterinary prescription
- vet and farm is legally obligated to record use
- in Europe the practice of non-therapeutic prophylactic use of antibiotics (growth enhancement) was banned in 2006
- due to the nature of the system metaphylactic use is necessary on those occasions when antibiotics are required
 - treating entire population though not all fish affected
 - oral in-feed administration
 - difficulty in isolating sick animals

Antimicrobial control in Scottish Aquaculture

Statutory requirements



In UK : no centralised collation of these data

Antimicrobial control in Scottish Aquaculture

Aquaculture industry Code of Good Practice (SSPO: 2006)
<http://scottishsalmon.co.uk/cogp/>).

Scottish Salmon Farming
Code of Good Practice
Growing a sustainable industry

Certification schemes

- address antibiotic use within their framework
 - (ASC: use of critical antibiotics a non-compliance)
- raise awareness of AMR
- additional testing commissioned by aquaculture company to fulfil requirements



Retailer requirements

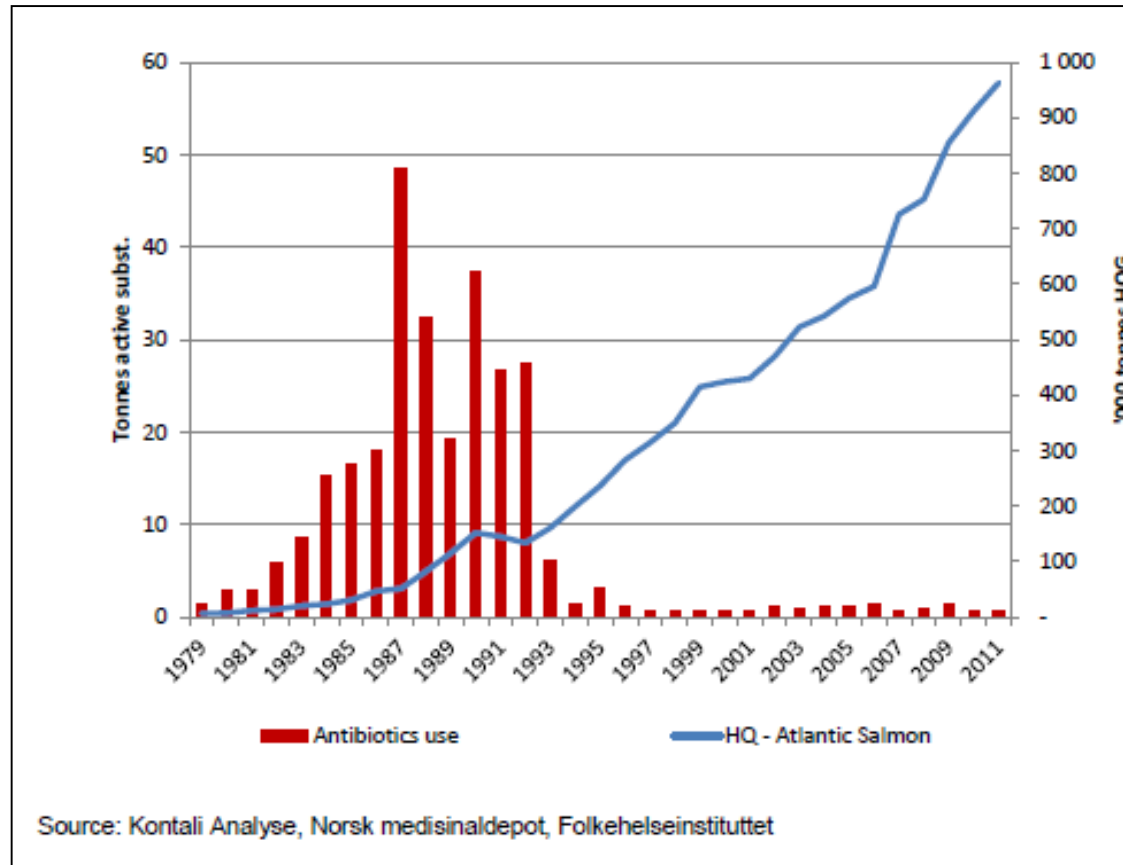
- additional testing commissioned by aquaculture company to fulfil requirements

Research on alternative treatments and improved monitoring

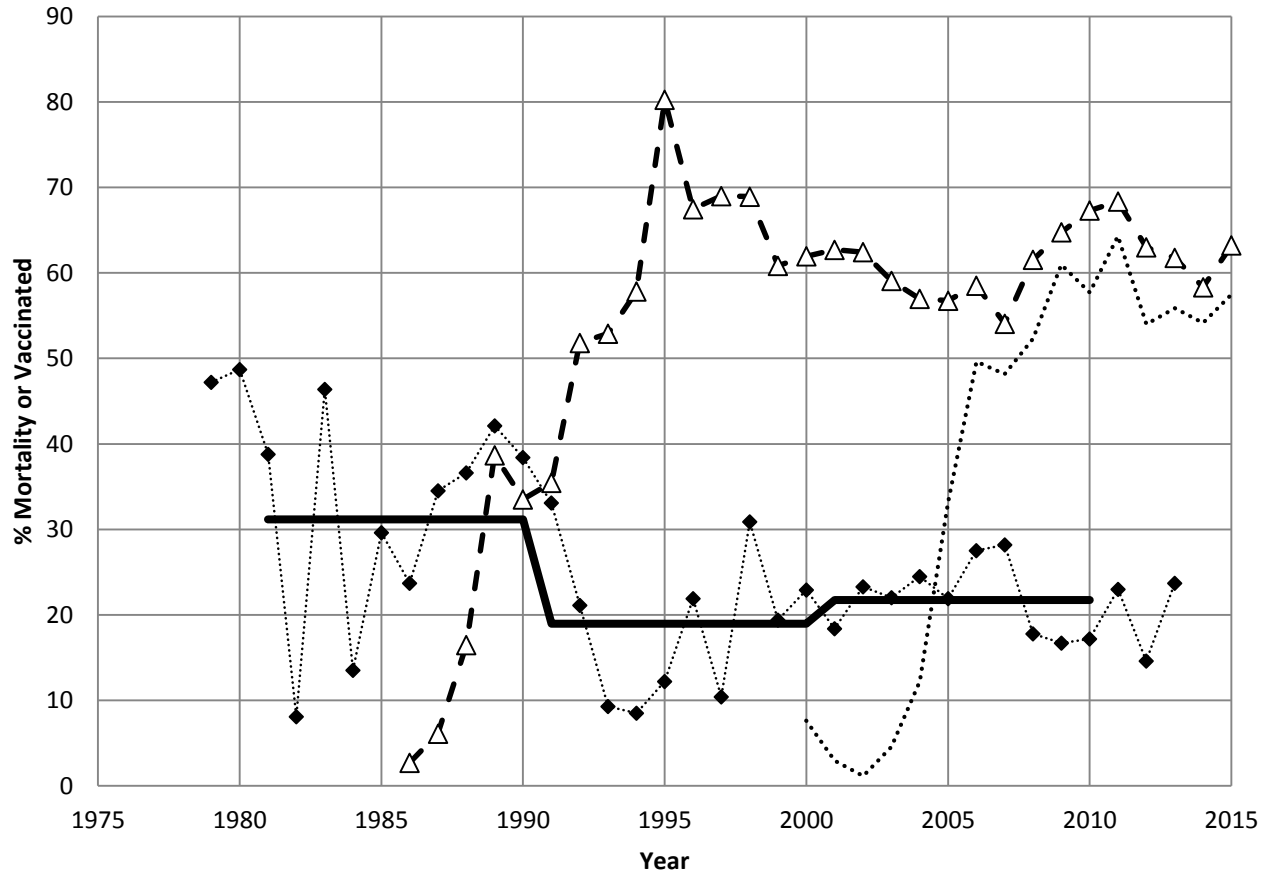
- EU, national, locally funded (industry and government)



Use of antibiotics in salmon aquaculture - Norway



Vaccination and drop in mortality in Scotland



◆ : average mortality

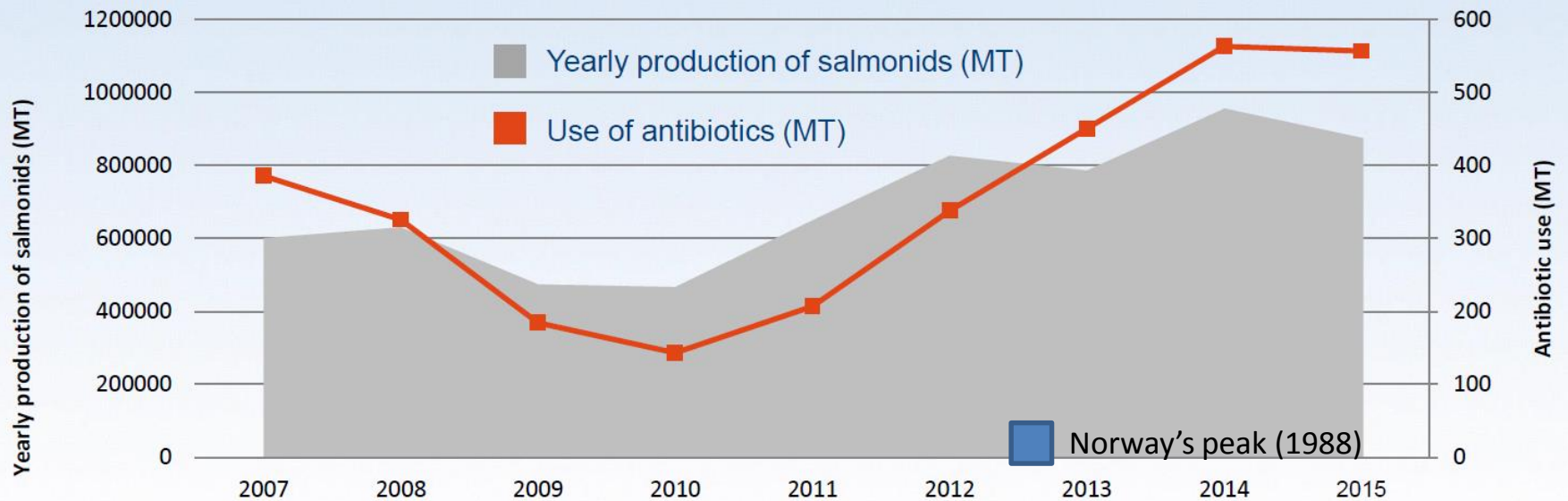
— : smoothed average mortality

△ : introduction of antibacterial vaccines

..... : introduction of IPNV vaccines

Use of antibiotics in salmon aquaculture - Chile

Production of salmonids and antibiotic use in Chile



Antibiotic use in UK farming sectors



Veterinary
Medicines
Directorate

	2008	2009	2010	2011	2012	2013
Cattle only	11	11	11	12	14	14
Pig only	62	62	47	62	65	61
Poultry only	31	37	50	23	22	19
Sheep only	<1	<1	<1	<1	<1	<1
Fish only	1	3	1	2	2	1
Pig + Poultry	195	205	252	162	245	226
Multispecies products	28	31	29	29	33	34
Total	328	349	390	290	381	355
% used on fish	0.30	0.86	0.26	0.69	0.52	0.28

in tonnes

- fish account for about 0.5% of antibiotics used in animal production in the UK
- antimicrobial sales for fish not provided by species/culture system to VMD

Example salmonid veterinary practice (Scotland)

- approximately 0.02 to 0.38 g/Tonne salmonids in a given year (antibiotics use per kg harvested biomass)
- Norwegian industry approximately 0.39g/T; Chile is approximately 660g/T
- the small amount still used, predominantly in FW culture, tends to be not spread across FW production – but associated with a few sites
 - usually reflects endemic challenges on a particular site (ERM, flavobacteria, furunculosis)
- many outbreaks of bacterial disease are spotted early on and accurately by site managers
 - know the signs of endemic/common diseases on their site
- where possible, and particularly where there is recurrence of a bacterial problem, will aim to recover and test isolates for resistance
- antibiotics for use with new host species (and their pathogens): extensive bacteriology/sensitivity testing being performed to understand what's present

Thanks to colleagues at FHI (MSS), SEPA, VMD, veterinary practices, for contributions.

Thanks for your attention.