

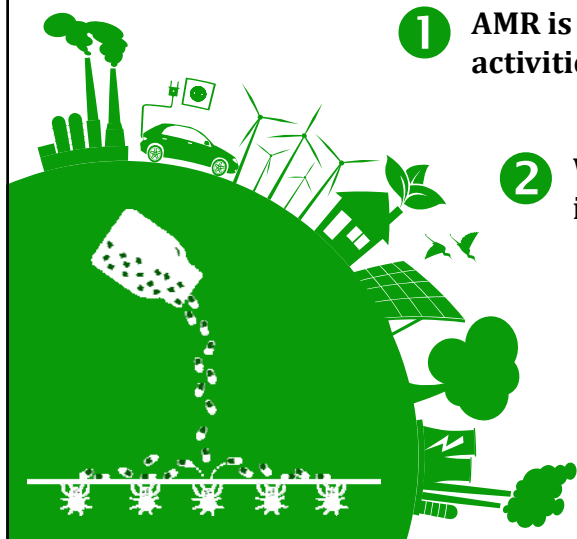


# Environment & Antimicrobial Resistance

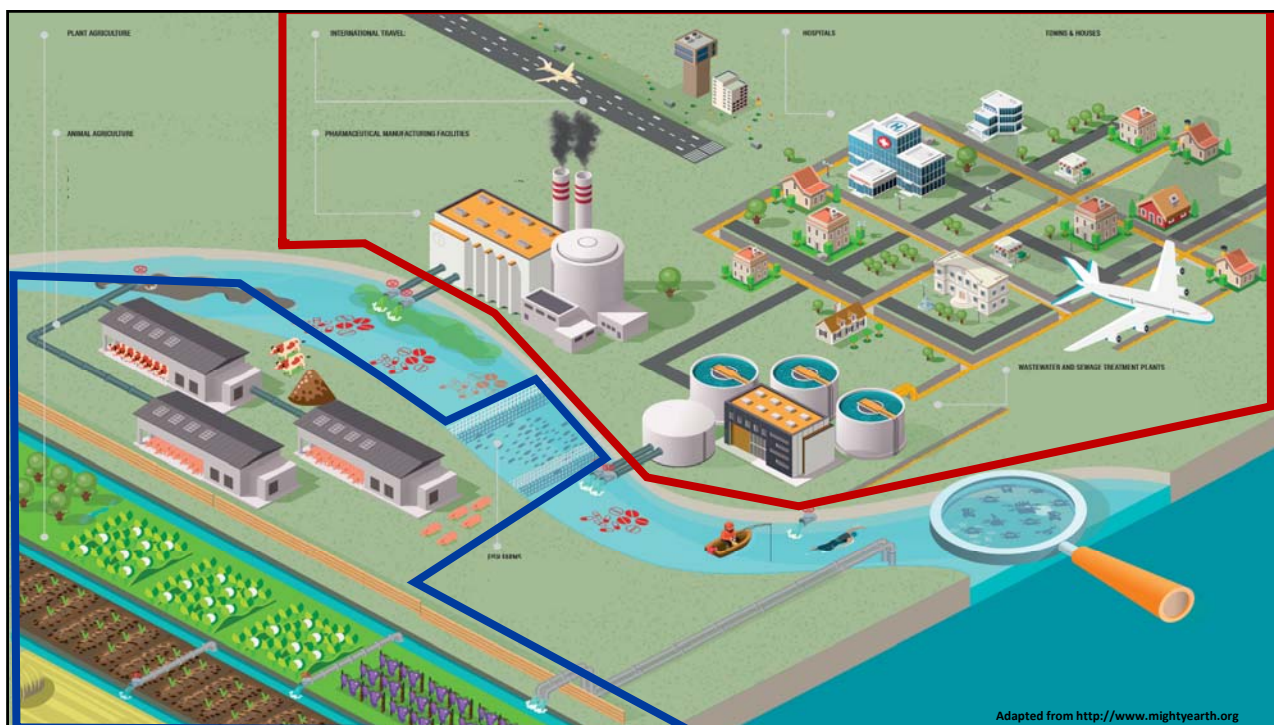
Gaute Lenvik  
Director-General



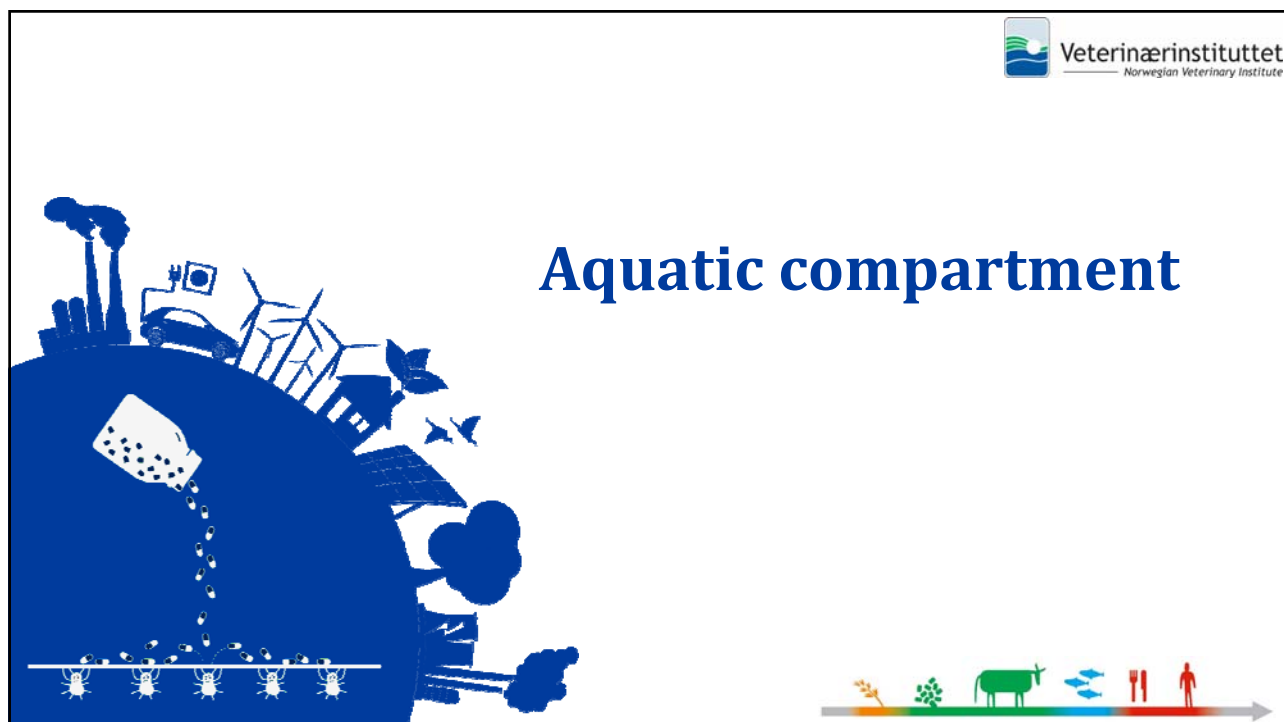
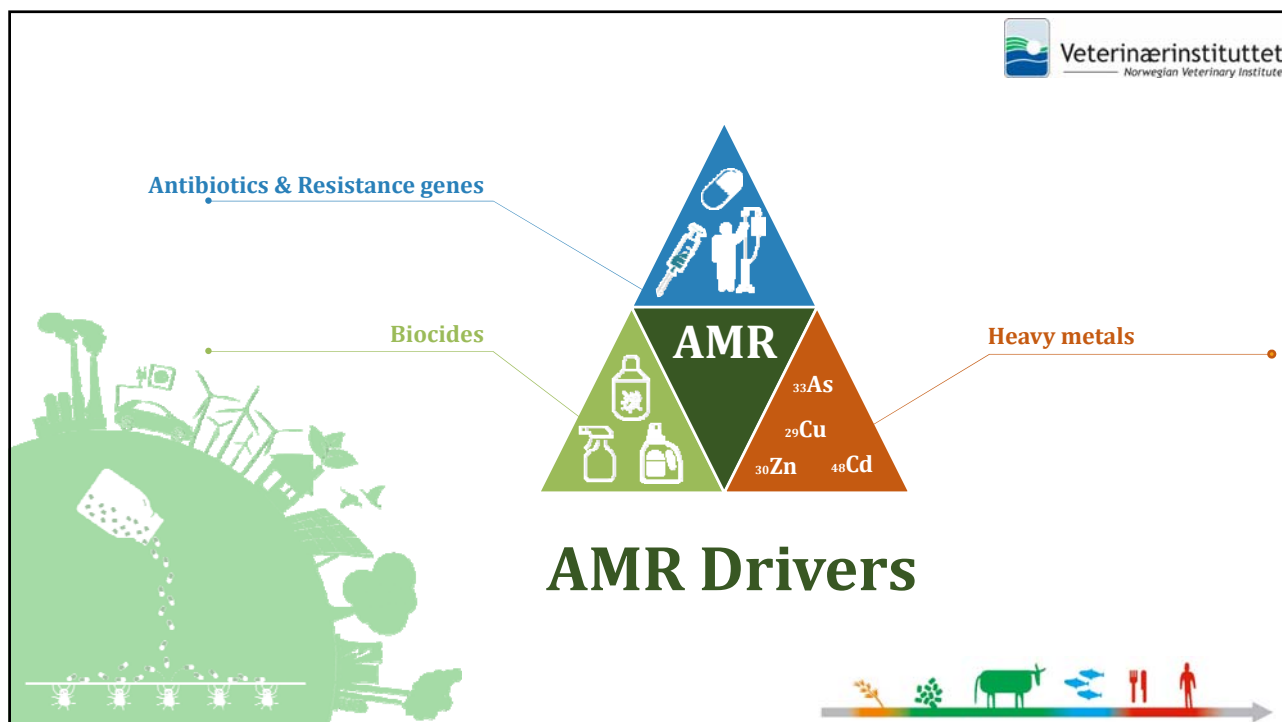
## In the environment...

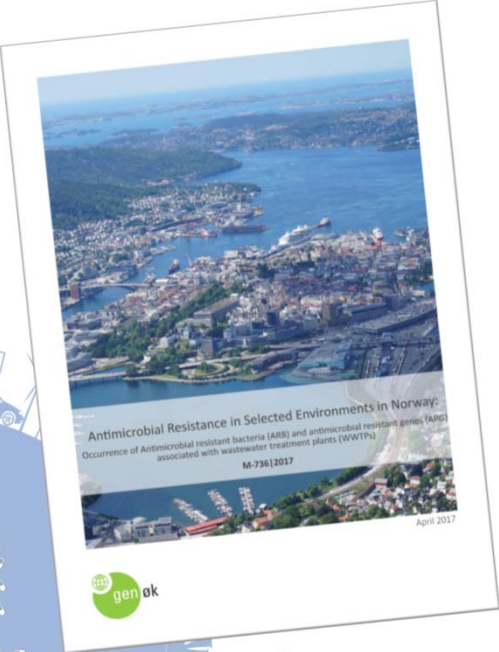



- 1** AMR is natural and ancient, but human activities are changing dynamics
- 2** Wildlife, among others, can be a good indicator to study AMR dynamics
- 3** Knowledge gaps require new tools, new measures and greater cooperation



Adapted from <http://www.mightyearth.org>





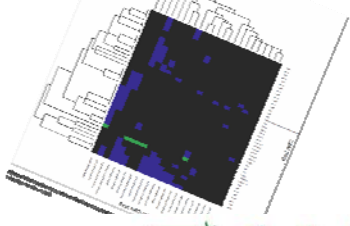



**Veterinærinstituttet**  
Norwegian Veterinary Institute


**Table 3: Detection of antibiotic resistance in sludge samples from selected areas in Trondheim and Bergen**

AREA	Total CFU	Resistance (%)									
		AMP	AMX	DCX	KM	STP	TET	CIP	ERI	TMP	SMX
Strandveien	1,1F+07	4	5	47	6	46	18	13	33	45	30
Hamna	3,0E+07	2	6	27	7	8	ND	42	8	44	52
Breivika	2,1E+07	3	12	22	9	10	ND	22	3	34	7
KVRI	4,3E+03	ND	ND	20	62	16	3	32	3/	33	86
LYR	2,9E+03	ND	40	29	13	12	ND	42	30	40	32
ST. 5	1,4F+04	ND	7	6	17	7	1	8	7	17	14



**ND = not detected, AMP = ampicillin, AMX = amoxicillin, DCX = dicloxacillin, KM = kanamycin, STP = streptomycin, TET = tetracycline, CIP = ciprofloxacin, ERI = erythromycin, TMP = trimethoprim, SMX = sulfamethoxazole**

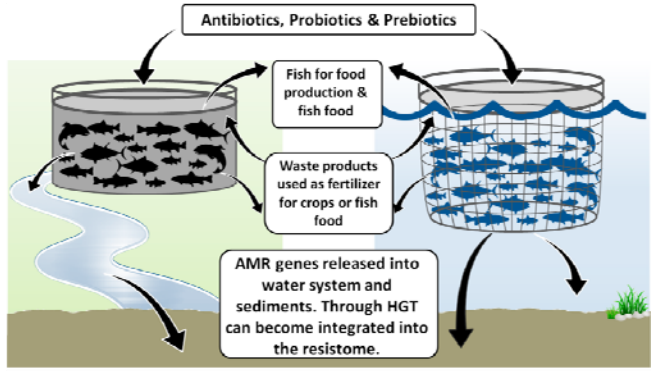



# Aquaculture




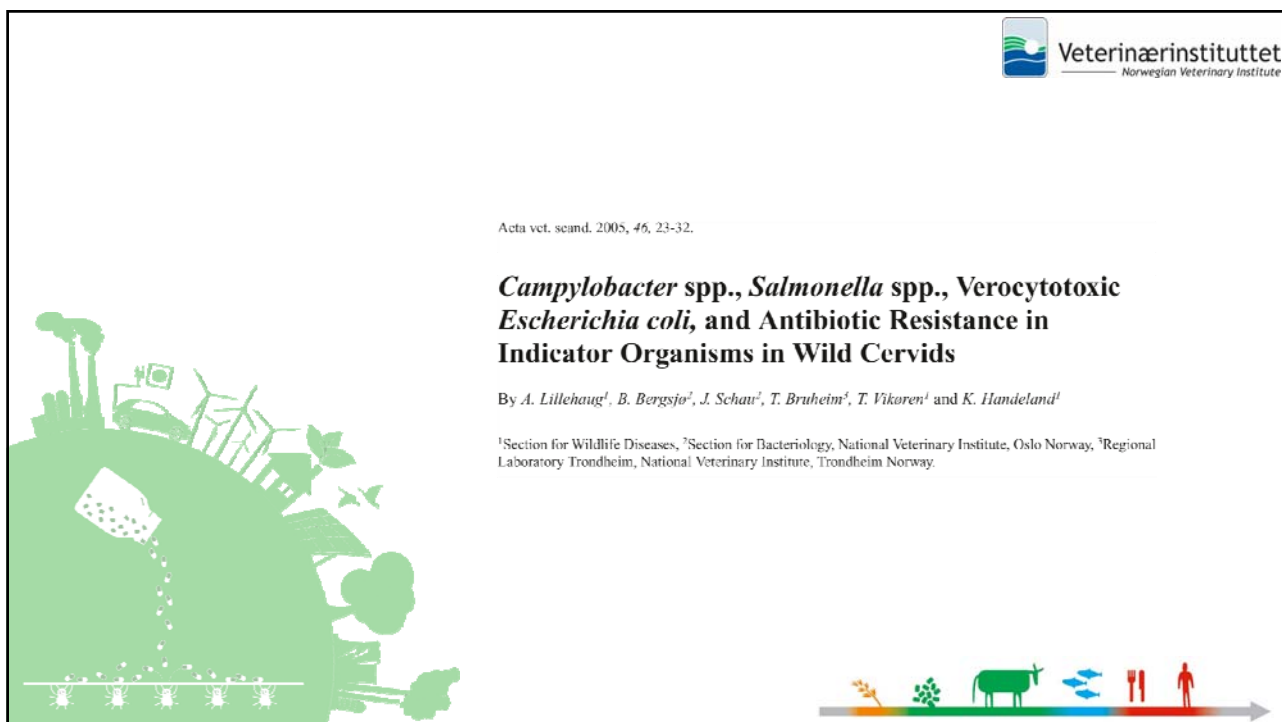
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*In: The Rising Tide of Antimicrobial Resistance in Aquaculture: Sources, Sinks and Solutions. Watts et al., Mar. Drugs 2017, 15(6), 158*







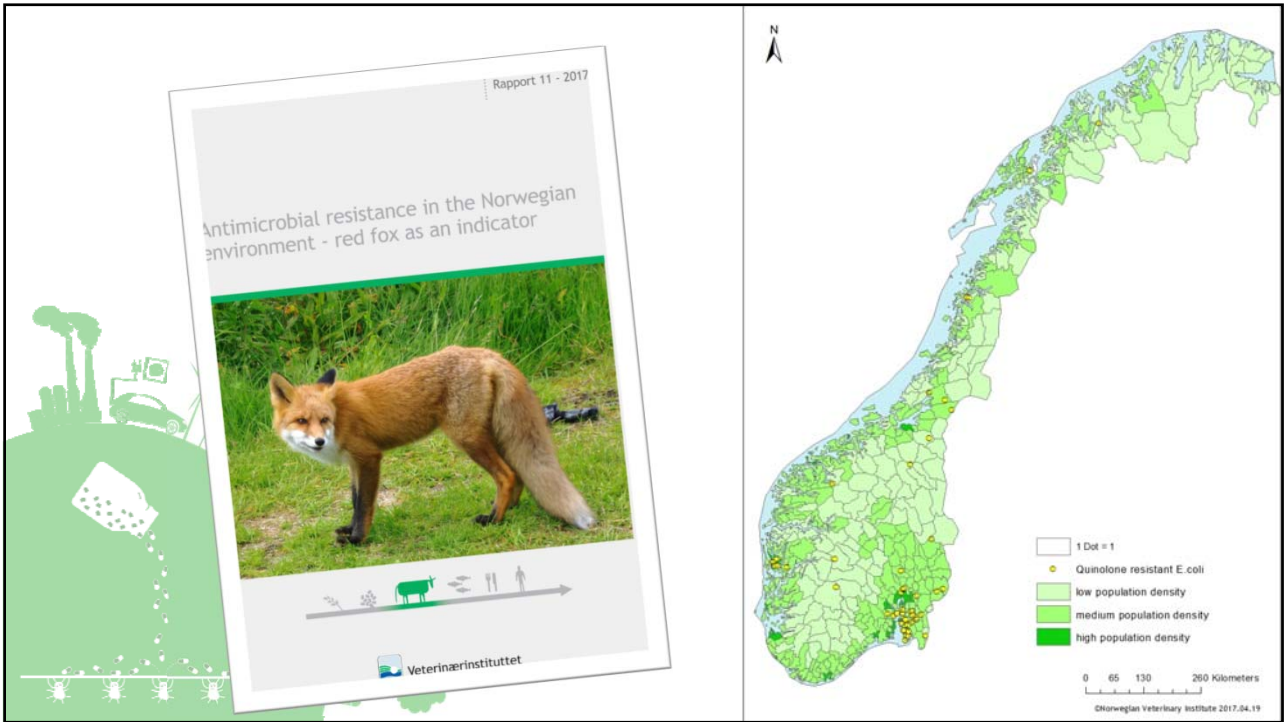




Photo: Knut Madslien

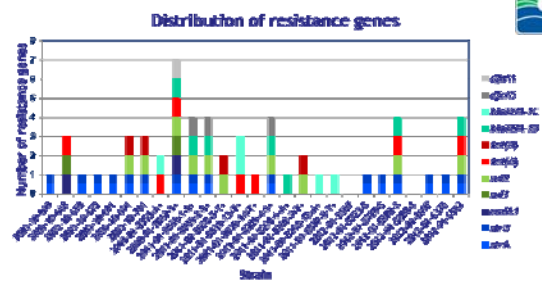


Figure 1. Isolates included in the study and their geographic resistance profile. Strains marked with "\*" are isolated from location of outbreak.

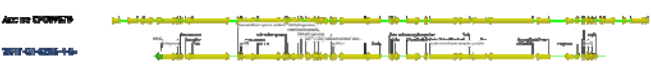
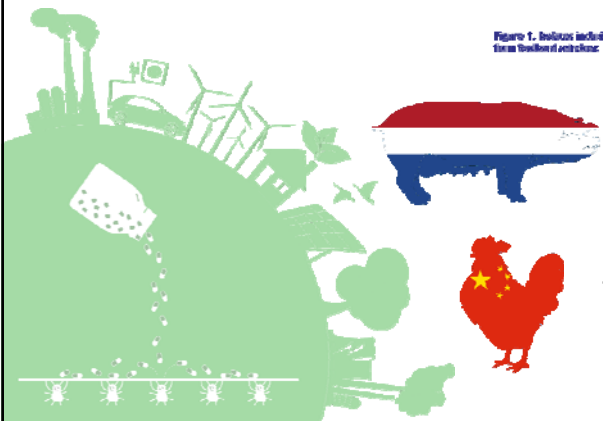


Figure 4. Structure of conjugative resistance plasmid originating from *E. coli* S011-01-0499-4-5] from Swabed reindeer and map of 35 kb region (below) with 98% identity to part of plasmid pRP1 plasmid 1 (CP000099) isolated from pig faeces in the Netherlands.

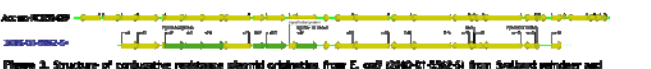


Figure 3. Structure of conjugative resistance plasmid originating from *E. coli* (2042-01-0362-5) from Swabed reindeer and map of a 19 kb region (below) containing resistance genes with 98% identity to part of plasmid pKCM21-F (NC033429) isolated from poultry in China.

# Gaps & Possibilities

