Increased use of medicines in Norwegian fish farming

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The increase in sales of agents to treat sea lice infestations continued in 2013. However, sales of antibacterials showed a reduction compared to the previous year. Sales of anthelmintics showed a slight increase compared to 2012. These figures come from the Norwegian Institute of Public Health.

Continued problems with resistant lice

Sales of agents against sea lice (in kilograms) have continued to increase since 2012. There was an increased use of all agents against lice except cypermethrin and azamethiphos. The biggest increase was for the chitin synthase inhibitors, diflubenzurone and teflubenzurone. In 2013, sales of

agents against sea lice were at levels seen in the early 1990s.

Taking into account the different dosage of the various agents, the figures show that the number of sea lice treatments was approximately at the same level in 2012 and 2013.

The trend in 2013 suggests continued high level of drug resistance in Norwegian salmon. Reduction in azametiphos use may indicate lack of efficacy, as well as use in combination with other agents at lower dosages. Resistance to some agents against sea lice has resulted in increased sales of other agents. Use of sea lice treatment has been high since 2009.

In 2012, the use of hydrogen peroxide was somewhat reduced compared to the previous two years. However, consumption has more than tripled from 2012 to 2013.

Still marginal use of antibacterials

The sale of antibacterials for use in farmed fish in Norway varied in the period 2009-2013 (see table 1), but because sales are very low, small variations in the number of disease outbreaks are reflected in the statistics. In relation to the biomass of farmed fish produced, there are marginal changes in antibacterial sales, which are very low; the amount of antibacterials sold in recent years equates to approximately 0.5 to 1 per cent of the fish being treated with a course of antibiotics.

Anthelmintic sales increasing

Sales of medicines against intestinal worms have shown an annual decline since 2004, but increased for the first time from 2010 to 2011. In 2012, sales tripled compared to 2011. In 2013 we see a slight increase

in sales compared with 2012.

Other agents

Consumption of the fungicide bronopol has been relatively stable in the period 2010-2012, but increased by 30 per cent in 2013.

Tables 1-5 show sales of antibacterials, sea lice treatment, anthelmintics, fungicides and anaesthetics used in Norwegian aquaculture in the period 2004-2013. The figures are based on sales from wholesalers and feed mills.

Table 1 Antibacterials (kg active ingredient)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
florfenicol	111	202	302	139	166	303	287	331	191	300
flumequin	4	28	7	18	1	1	0	0	0	0
lincomycin/ spectinomycin (1:2)	-	-	50	66	70	43	57	0	0	0
oxolinic acid	1035	977	1119	406	681	926	308	212	1399	672
oxytetracycline	5	18	0	19	23	40	10	1	1	0
Total	**1159**	**1215**	**1478**	**648**	**941**	**1313**	**662**	**544**	**1591**	**972**

Table 2 Sea lice treatment (kg active ingredient)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
azametiphos	-	-	-	-	66	1884	3346	2437	4059	3037
cypermethrin	55	45	49	30	32	88	107	48	232	211
deltamethrin	17	16	23	29	39	62	61	54	121	136
diflubenzurone	-	-	-	-	-	1413	1839	704	1611	3264
emamectine	32	39	60	73	81	41	22	105	36	51
teflubenzuron	-	-	-	-	-	2028	1080	26	751	1704
Total	**104**	**100**	**132**	**132**	**218**	**5516**	**6454**	**3374**	**6810**	**8403**
hydrogen-peroxide (ton)	-	-	-	-	-	308	3071	3144	2538	8262

Table 3 Anthelmintics (kg active ingredient)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
fenbendazole	23	78	27	1	0	0	0	0	0	0
praziquantel	412	122	145	94	91	29	11	137	423	460
Total	**435**	**200**	**172**	**95**	**91**	**29**	**11**	**137**	**423**	460

Table 4 Fungicides (kg active ingredient)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
bronopol	314	377	492	493	751	508	1020	1003	1090	1418
malachite green	0.7	0.9	0.9	0.8	0.6	0	0	0	0	0
Totalt	**315**	**378**	**493**	**494**	**752**	**508**	**1020**	**1003**	1090	1418

Table 5 Anaesthetics (kg active substance)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
benzocaine[1)]	500	400	400	700	800	800	800	1000	800	1100
isoeugenol	2.6	-	6.8	5.2	26	34	68	96	134	323
tricaine mesilate (metacaine)	737	960	1248	1269	2164	2379	2815	3449	3481	4262

1) Estimated sales

Provided by Norwegian Institute of Public Health