

THE REPUBLIC OF THE UNION OF MYANMAR
MINISTRY OF AGRICULTURE, LIVESTOCK & IRRIGATION
DEPARTMENT OF FISHERIES



FISH INSPECTION & QUALITY CONTROL SECTION
RESEARCH AND DEVELOPMENT DIVISION

National Residues Monitoring Plan for Aquaculture Products

Progress Report for the NRMP 2017/18

March 2018

Progress Report for the NRMP for Certain Harmful Substances in Aquaculture Fish for 2017/2018

1. General

The National Residues Monitoring Program (NRMP) for certain harmful veterinary drugs and others substances in aquaculture fish and products is implemented with allocated budget and plan approved by the Ministry of Agriculture, Livestock and Irrigation (MOALI). The DOF within MOALI is the designated Central Competent Authority (CCA) for fishery product exports to the EU. Quality Control and Research Section of (R&DD)(QCRS) under Department of Fisheries (DOF) is responsible for carrying out the NRMP in accordance with the written procedures described in Official Control System Manual (OCSM) for the Inspection and Certification of Fish and Fishery Products. The Residues Monitoring Committee (RMC) is responsible for managing the effective implementation, monitoring and reporting of all NRMP activities. The Inspection and Certification Unit and the Analytical Laboratory Unit of QCRS are responsible for sampling and testing respectively.

2. Scope and species monitored in 2017/18

The NRMP 2017-2018 is a segregated system including 38 farms from 8 townships in three Regions. The 38 farms are linked with a total of 38 processing factories approved for export to EU and only products from these processing factories with documented traceability to the included farm would be allowed to export products from aquaculture to EU. Currently there is however not yet any processing factories approved for export of aquaculture products to EU. The scope of the segregated system is in Table 1.

2.1 Scope and species monitored by regions

Table1: Scope of the NRMP 2017/18

| Region | Township | Area(Ha) | Total Production in the Segregated System (MT) | Farms | Aquaculture Species |
|--------------|------------|----------------|--|-----------|---|
| Yangon | Kyauk Tan | 178.88 | 914.76 | 3 | Crab (<i>Scyllaserrata</i> and <i>Scylla olivacea</i>) |
| Yangon | TwanTay | 208.85 | 1678.59 | 7 | Carfu (<i>Cyprinus carpio</i>), Rohu (<i>Labeo rohita</i>), Tilapia (<i>Oreochromis spp.</i>), Pangush (<i>Pangasius spp.</i>), Puti (<i>Puntius</i>), Katla (<i>Catla catla</i>), Mrigal (<i>Cirrhinus spp.</i>) |
| Ayeyarwaddy | NyaungDone | 459.86 | 2386.31 | 7 | Carfu (<i>Cyprinus carpio</i>), Rohu (<i>Labeo rohita</i>), Tilapia (<i>Oreochromis spp.</i>), Pangush (<i>Pangasius spp.</i>), Puti (<i>Puntius</i>), Katla (<i>Catla catla</i>), Mrigal (<i>Cirrhinus spp.</i>) |
| Ayeyarwaddy | MaUBin | 1217.83 | 7739.44 | 13 | Carfu (<i>Cyprinus carpio</i>), Rohu (<i>Labeo rohita</i>), Tilapia (<i>Oreochromis spp.</i>), Pangush (<i>Pangasius spp.</i>), Puti (<i>Puntius</i>), Katla (<i>Catla catla</i>), Mrigal (<i>Cirrhinus spp.</i>) |
| Ayeyarwaddy | Pathein | 83.00 | 240.00 | 1 | Asian tiger shrimp (<i>Penaeus monodon</i>) and whiteleg shrimp (<i>Penaeus vannamei</i>) |
| Ayeyarwaddy | Laputta | 104.77 | 591.00 | 3 | Crab (<i>Scyllaserrata</i> and <i>Scylla olivacea</i>) |
| Ayeyarwaddy | Ngaputaw | 445.87 | 210 | 1 | Asian tiger shrimp (<i>Penaeus monodon</i>) |
| Thanintharyi | Kyunsu | 274.87 | 1022 | 3 | Crab (<i>Scyllaserrata</i> and <i>Scylla olivacea</i>) whiteleg shrimp (<i>Penaeus vannamei</i>) |
| Total | | 2973.93 | 14782.10 | 38 | |

2.2 Sampled species

All samples have been collected at farms, included in the segregated system, at all stages of production. For Group A substances several sizes of the animals from nursery farms and grow out farms were taken and for Group B Substances the size of animals were mostly approximately 900 g to 1 kg (market size).

Detailed monthly sampling schedule for 2017/18 has been completed by the Inspection and Certification Unit (ICU), Quality Control and Research Section of (R&DD) (QCRS) of Research and Development Division (R&DD) teams under the supervision of the RMC.

Table2–PlacesofSampleCollection

| No. | Production Stage | Samples taken | Testing parameters |
|-----|------------------|---|--------------------|
| 1. | Aquaculture site | Farmed fish at all growth stages | A1, A3, A6 |
| 2. | Aquaculture site | Farmed fish ready to be place on the market | B1,B2a,B3a,B3c,B3e |
| 3. | Aquaculture site | Dried feed pellets and raw | B3d(AflatoxinB1) |

Note:

- A1Group(stilbenes):Diethylstilbestrol–Finfish only
- A3Group(steroids):Methyltestosterone–Finfish only
- A6 Group(prohibited veterinary medicines):Chloramphenicol,Nitrofurans–Finfishand Crab.
- B1Group (Antibacterial Substances): Tetracycline, Chlorotetracycline, Oxytetracycline, Oxolinic acid, Florfenicol, Amoxicillin, Lincomycin–Finfish and Crab
- B2a Anthelmintics (Praziquantel, Ivermectin)–Finfish and Crab
- B3a Group(Organochlorinated, Pesticides):DDT, Aldrin, Dieldrin, Alpha-HCH ,Beta-HCH, Lindane, Heptachlor, Endrin, Sum of Dioxin,dioxin like PCBs and sum of PCBs–Finfish and Crab
- B3c Group(Heavy metals): Pb, Cd, Hg–Finfish and Crab
- B3d Group(Mycotoxin):Aflatoxin(B1)–Feed/Pellet–Finfish only (note: crab feed is chopped up local fresh fish)
- B3e Group(dyes):MG/LMG,CV/LCV–Finfish and Crab

3. Sampling and Testing

3.1 Sampling

In 2017/18, the sampling was carried out by the Inspection and Certification Unit (ICU) in compliance with the plan approved by the R M C. However, following monthly reports by local authorities and processing factories, QCRS include the Inspection and Certification Unit (ICU) and Analytical Laboratory Unit (ALU) amended monthly sampling plan to be appropriate to current local context. Sampling activities carried out in 2017/18 by regions are showed in Table 3.

Table 3.1: Sampling in 2017/18

| Regions | Yangon (Kyauk Tan) | | Yangon (Twantay) | | Ayeyarwaddy (Nyaung Done) | | Ayeyarwaddy (Ma U Bin) | | Ayeyarwaddy (Patheingyi) | | Ayeyarwaddy (Laputta) | | Tannintharyi (Kyun Su) | | Ayeyarwaddy (Ngaputaw) | | Total | | | Remarks |
|--|--------------------|----------|------------------|----------|---------------------------|----------|------------------------|----------|--------------------------|----------|-----------------------|----------|------------------------|----------|------------------------|----------|-------|----------|------------|-------------------------------|
| | Plan | De facto | Plan | De facto | Plan | De facto | Plan | De facto | Plan | De facto | Plan | De facto | Plan | De facto | Plan | De facto | Plan | De facto | Difference | |
| Group of Substances | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20=(19-18) | (+ = Extra) (- = Required) |
| A1 Group (Stilbenes): Diethylstilbestrol | 0 | 0 | 2 | 2 | 3 | 3 | 9 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 16 | 2 | +2 |
| A3 Group (Steroids) Methyltestosterone | 0 | 0 | 2 | 1 | 3 | 3 | 9 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 13 | -1 | -1 |
| A6 Group (Prohibited Veterinary medicines); Chloramphenicol, Nitrofurans | 3 | 3 | 2 | 2 | 3 | 3 | 9 | 9 | 1 | 1 | 2 | 2 | 4 | 4 | 1 | 1 | 25 | 25 | 0 | 0 |
| B1 Group (Antibacterial Substances): Tetracycline, Chlorotetracycline, Oxytetracycline, Oxolinic acid, Florfenicol, Amoxicillin, Lincomycin ¹ | 3 | 3 | 6 | 5 | 8 | 9 | 26 | 28 | 1 | 1 | 2 | 2 | 4 | 4 | 1 | 1 | 51 | 53 | 2 | 0 |
| B2a: Anthelmintics (Praziquantel) | 1 | 1 | 3 | 3 | 3 | 3 | 10 | 12 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 22 | 24 | 2 | +2 |
| B3a Group (Organochlorinated Pesticides): DDT, Aldrin, Dieldrin, Alpha- ² HCH, Beta-HCH, Lindane, Heptachlor, Endrin, Dioxin, sum of Dioxin, Dioxin like PCBs | 1 | 2 | 1 | 2 | 1 | 2 | 2 | 3 | 0 | 0 | 1 | 2 | 1 | 2 | 1 | 2 | 8 | 15 | 7 | +7 |
| B3c Group (Heavy Metals):, Pb, Cd, Hg | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 6 | 8 | 2 | 3 |
| B3d Group (Mycotoxin) : Aflatoxin (B1) | | | 1 | 5 | 2 | 4 | 10 | 16 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 14 | 26 | 12 | +12 |

¹ Extend the parameters started in October 2017

² Extend the parameters started in October 2017

| | | | | | | | | | | | | | | | | | | | | |
|-------------------------------------|----|----|----|----|----|----|----|----|---|---|---|---|----|----|---|---|-----|-----|----|-----|
| B3e Group (Dyes): MG/LMG, CV/LCV | 1 | 2 | 1 | 0 | 1 | 1 | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 6 | 0 | 0 |
| Total | 10 | 12 | 19 | 21 | 25 | 29 | 79 | 93 | 4 | 4 | 6 | 7 | 13 | 15 | 4 | 5 | 160 | 186 | 26 | +26 |

Note: Plan number of samples is changed when compare with Original Sampling Plan that submitted to EU, cause of the production rate increase a bit according to **Annex I** updated excel plan.

Under the NRMP2017/18, a total of 186 samples were taken thus completing 116% (of 159 samples collected, extended 7 samples for Dioxin and PCBs and 20 Non compliances) is the plan. The above table shows that the sampling completed in the regions was over the plan.

3.2 Testing results

A6 Group (Prohibited Veterinary Medicines): Chloramphenicol, Nitrofurans were tested at ALU (Lab1) and other substances were tested in Central Laboratory Thailand (Lab2). A3Group (Steroids): Methyltestosterone and B2a: Anthelmintics(Praziquantel) were tested in NAFIQAD 4 Laboratory Vietnam (Lab3) and Dioxin , Sum of Dioxin and Dioxin liked PCBs were tested in TUV Lab (Italy) (Lab 4).

Analytical results for 2017/18 are shown in Table 4 and 5

Table4 : Analytical Results in 2017/18

| Groups | Non-Compliant Results/Total SamplesAnalysed(%) |
|---|--|
| | Year2017/18 |
| A1 Group (Stilbenes): Diethylstilbestrol | 2(12.50) |
| A3 Group (Steroids): Methyltestosterone | 0 |
| A6 Group (Prohibited Veterinary Medicines): Chloramphenicol, Nitrofurans | 0 |
| B1 Group (Antibacterial substances): Tetracycline, Chlorotetracycline, Oxytetracycline, Oxolinicacid, Florfenicol, Amoxicillin, Lincomycin | 4(7.54) |
| B2a: (Anthelmintics): Praziquantel), Ivermectin | 2(11.76) |
| B3a Group(Organochlorinated Pesticides): DDT, Aldrin, Dieldrin, Alpha-HCH, Beta-HCH, Lindane, Heptachlor, Endrin, Dioxin , Sum of dioxin and dioxin like PCBs | 0 |
| B3c Group(Heavy metals): Pb,Cd,Hg | 0 |
| B3d Group (Mycotoxin): Aflatoxin(B1) | 11(42.30) |
| B3e Group(Dyes): MG/LMG,CV/LCV | 1(16.67) |

Table5: Testing Resultsin2017/18

| GROUP OF SUBSTANCES TO BE MONITORED | COMPOUND or MARKER RESIDUE | MATRIX ANALYSED | NUMBER OF SAMPLES | | LEVEL OF ACTION (i.e. concentration above which a result is deemed non-compliant) [µg/Kg] | NUMBER OF NON COMPLIANT RESULTS (ABOVE LEVEL OF ACTION) | |
|---|----------------------------|-----------------|-------------------|------------|---|---|---|
| | | | PLANNED | TESTED | | | |
| A1. STILBENES | (Diethylstilbestrol) | LC/MS/MS | 14 | 16 | Any Detected | 2 | |
| | | | | | | | |
| A3. SYNTHETIC STEROIDS (WITH ANDROGENIC, GESTAGENIC OR ESTROGENIC ACTIVITY) | (Methyltestosterone) | LC/MS/MS | 14 | 13 | | 0 | |
| | | | | | | | |
| A6. CHLORAMPHENICOL | Chloramphenicol | ELISA | 25 | 25 | Any Detected | 0 | |
| A6. NITROFURANS | | | | | | | |
| Nitrofurantoin metabolite | AHD | LC/MS/MS | | 25 | | | 0 |
| Furaladone metabolite | AMOZ | LC/MS/MS | | 25 | | | 0 |
| Furazolidone metabolite | AOZ | LC/MS/MS | | 25 | | | 0 |
| Nitrofurazone metabolite | SEM | LC/MS/MS | | 25 | | | 0 |
| | | | | | | | |
| B1. ANTIBACTERIAL SUBSTANCES Confirmatory test | Tetracycline | HPLC | 51 | 53 | 100 | 0 | |
| | Chlorotetracycline | HPLC | | 53 | 100 | 0 | |
| | Oxytetracycline | HPLC | | 53 | 100 | 0 | |
| | Oxolinic | LC/MS/MS | | 53 | 100 | 0 | |
| | Florfenicol | LC/MS/MS | | 53 | 0.5 | 4 | |
| | Amoxicillin | LC/MS/MS | | 29 | | | |
| | Lincomycin | LC/MS/MS | | 29 | | | |
| B2a. ANTHELMINTICS | Praziquantel | LC/MS/MS | 22 | 24(22) | Any Detected | 0 | |
| | Ivermectin | LC/MS/MS | | 17 | | | 2 |
| | | | | | | | |
| B3a. ORGANOCHLORINE COMPOUNDS INCLUDING PCBS | Aldrine | GC/µECD | 8 | 8 | 10 | 0 | |
| | Dieldrine | | | 8 | 10 | 0 | |
| | DDT | | | 8 | 10 | 0 | |
| | Alpha-HCH | | | 2 | | | |
| | Beta-HCH | | | 2 | | | |
| | Lindane | | | 2 | | | |
| | Heptachlor | | | 2 | | | |
| | Endrin | | | 2 | | | |
| | Dioxin | | 7 | 7 | 0.5 | 0 | |
| | Sum of Dioxin | | | 7 | | 0 | |
| Dioxin like PCBS | | | 7 | | 0 | | |
| B3c. CHEMICAL ELEMENTS | Lead(Pb) | ICPMS | 6 | 9 | 300 | 0 | |
| | Mercury(Hg) | | | 9 | 500 | 0 | |
| | Cadmium(Cd) | | | 9 | 50 | 0 | |
| B3d. MYCOTOXINS | Aflatoxin B1 | HPLC | 14 | 26 | 20 | 11 | |
| B3e. DYES | Malachite green | LC/MS/MS | 6 | 5 | Any Detected | 1 | |
| | Leukomalachite green | | | | | | 0 |
| | Crystal Violet and | | | | | | 0 |
| | Leuco-crystalviolet | | | | | | 0 |
| Total | | | 160 | 186 | | 20 | |

3.2.1 Result for fish and crab samples collected at farms

GroupA1: Diethylstilbestrol residues 2 samples/16 analyzed (12.50%) were found with positive results.

GroupA3: Methyltestosterone residues were not detected in 13 samples

GroupA6: Prohibited antibiotics:

- *Chloramphenicol residues were not detected in 25samples.

- *Nitrofurans residues were not detected in 25samples.

GroupB1: Restricted antibiotics in 53 samples

- *Tetracycline residues were not detected in 53 samples.

- *Oxytetracycline residues were not detected in 53 samples.

- *Chlorotetracycline residues were not detected in 53 samples.

- *Oxolinic acid residues were not detected in 53 samples.

- *Florfenicol residues were detected in 4 of 53 samples (7.54%).

- *Amoxicillin residues were not detected in 29 samples.

- *Lincomycin residues were not detected in 29 samples.

GroupB2a: Anthelmintics(Praziquantel) residues were not detected in 24 samples

Anthelmintics(Ivermectin) residues were detected in 2 of 17 Samples (11.76%).

Groups B3a, B3c: Environmental contaminants:

- *There was no detection of Organochlorine Pesticides residues (GroupB3a) in 15 samples.

- *Heavy Metals residues (Group B3c): were below action level in 9 samples. However, they were below the action levels.

Group B3d Aflatoxin(B1):11 feed samples/ 26 analyzed (42.30%) were found positive with results above the action limit of 20µg/kg (EU Directive 2002/32/EC).

GroupB3e: Dyes: Malachite Green/ Leuco_malachite green and Crystal Violet/ Leuco_crystal violet, Malachite Green was detected in 1 of 6 samples (16.67%).

3.3 Follow up Action to Non-Compliant Results

Related to *Diethylstilbestrol (Group A1)*

The findings were from 2 farms and in small fish (less than 200g) not ready to be placed on

the market. The RMC immediately informed to farm by official letter when the non-compliance result was found. The farmer was instructed to withhold harvest the fish until result of investigation. Inspectors collected sample again after one month and found negative result. The farmer was instructed to take action to clarify the source of contamination and prevent reoccurrence. Result will be followed up in the 2018-2019.

Related to *Florfenicol* (**Group B1**)

The findings were from 4 farms and in fish ready to be placed on the market. The RMC immediately informed to farm by official letter when the non-compliance result was found. The farmer was instructed to withhold harvest the fish until result of investigation. Inspectors collected sample again after one month and found negative result. The farmer was instructed to take action to clarify the source of contamination and prevent reoccurrence. Result will be followed up in the 2018-2019.

Related to *Ivermectin* (**Group B2a**)

The findings were from 1 farm and in fish ready to be placed on the market. The follow up by testing of further sample is still ongoing. The RMC immediately informed to farm by official letter when the non-compliance result was found. The farmer was instructed to withhold harvest the fish until result of investigation. Inspectors collected sample again after one month and found negative result. The farmer was instructed to take action to clarify the source of contamination and prevent reoccurrence. Result will be followed up in the 2018-2019.

Related to *Aflatoxin (B1)* (**Group B3d**):

The positive findings could be confined to feed delivered from one factory to five farms and to one sample of rice bran in one farm. Results will be followed up with sampling from feed factories in the 2018-2019 plan.

The RMC immediately informed to farm by official letter when the non-compliance result was found and requested them to take out the feed from farm, and requested to use the new feed with good quality and fresh, including:

- Request farm owners to check the quality and shelf-life of feed;
- Request farm owners to buy fish feed from the approved feed suppliers;
- Request farm owners to store fish feed under hygienic conditions;
- Strengthening communication on regulations to farmers;
- Provide guidelines to farmers to comply with the fresh and clean feed use.

Related to *Malachite Green* (**Group B3e**)

The finding was from 1 farm in soft shell crab ready to be placed on the market. The RMC immediately informed to farm by official letter when the non-compliance result was found. The farmer was instructed to withhold harvest the fish until result of investigation. Inspectors collected sample again after one month and found negative result. The farmer was instructed to take action to clarify the source of contamination and prevent reoccurrence. Result will be followed up in the 2018-2019.

4. Conclusion

The 2017/2018 National Residues Monitoring Plan for certain harmful veterinary drugs and others substances in aquaculture products (fish, shrimp and crabs) was set up and implemented in accordance with the legal requirement promulgated by the DOF Directive 3/2009 of 3 April 2009 of the Department of Fisheries, Ministry of Agriculture, Livestock and Irrigation, which adopted all relevant food control legislation and subsequent corrigenda and updates of the European Commission.

By May 2015 the Department of Fisheries issued a new Directive 2/2015 on Technical Regulations for Export and Import of Fisheries Products. The directive including among others the detailed requirements for planning and implementing of the NRMP in Myanmar is fully enforced since 1st August 2016.

Under the 2017-18 plan a total of 186 samples of fish, shrimp and soft shell crabs were tested for residues of veterinary medicines and environmental contaminants and 177 (95%) were found in compliance with legal requirements. Non-compliant findings related to diethylstilbestrol in small fish not ready to be placed on the market and to florfenicol, ivermectin and malachite-green. Actions have been taken towards the non-compliant findings. The results and experiences from this year as well as the previous 4 years have been used in the planning of the 2018-2019 Plan.

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