Preface
This report will follow the first publication of WG13: Energy Flow, Environment and Ethical Implications for Meat Production (Robert A. Kanaly, Lea Ivy O. Manzanero, Gerard Foley, Sivanandam Panneerselvam and Darryl Macer; RUSHSAP, UNESCO Bangkok, 2010), which focused on industrial style agriculture with land animals. This second report will examine similar issues from the expanding use of aquaculture. Submissions of case studies from different communities are requested, along with general contributions to the relevant sections listed below.

Outline

Acronyms

Foreword

Executive summary

1. Aquaculture and intensive aquatic meat production
   1.1 Role of fish in food security
   1.2 Aquaculture and marine capture
   1.3 Intensive aquatic meat production
   1.4 Market demands for increased intensification
   1.5 Ethical concerns resulting in increased consumption of fish
   1.6 Relationship of fish consumption and environmental sustainability

2. Negative externalities
   2.1 Biological, chemical and physical impacts on the ecosystem
       (Effects of escaped farmed fish from enclosures: interbreeding with the natural populations, eating or displacing them, including issues of genetic modification.)
   2.2 Habitat loss and modification
   2.3 Spread of pests and diseases
       (As is the case for intensive land-based meat production, there are disease issues that are a direct result of growing animals in high density, severely crowded conditions...
where the animals are already under a high amount of stress. These include, for example,
(a) Sea lice infestation
(b) Infectious salmon anemia virus
(c) Bacterial kidney disease
(d) *Vibrio salmonicida*
(e) Enteric septicemia
(f) Salmon rickettsial disease
(g) *Vibrio* species in penaeid aquaculture

2.4 Dependence on raw (trash) fish and fish meal
(Protein consumption versus production: Large fin fish must eat many smaller fish for every kilogram of finfish)

2.5 Socioeconomic impacts
(General explanation of energy flows and economics in aquatic meat production.)

2.6 Production and dissemination of antibiotic-resistant organisms
(The relationship of aquatic meat production to avian influenza and the potential for causing regional and global infectious disease pandemics.)

2.7 Prions

2.8 Contamination of aquatic meat with heavy metals.

2.9 Contamination of aquatic meat with persistent organic pollutants.

2.10 Hormone administration.

2.11 Radiosotopes in the aquatic meat food chain

2.12 Lack of testing and/or release of data to the public.

2.13 Impacts of climate change on aquaculture and IAM production
   2.13.1 Detecting El-Nino Southern Oscillation (ENSO)-linked sardine-anchovy regime shift in the Philippines

2.14 Impacts of aquaculture and IAM production on climate change

3. Aquatic meat production practices
   3.1 Philippines
      3.1.1 Small-Scale Aquaculture Farming
      (Case Studies on length-weight relationship of tilapia in Camarines Norte pond; Gut content analysis of tilapia: Implications to reduce reliance on feeds; and Effect of climate change (increased temperature) on a small fish pond in Pampanga)

3.1.2 Harvesting methods and common practices

4. Post-harvest technology in aquatic meat production
   4.1 Existing international guidelines
   4.2 General post-harvest technology of fish
      4.2.1 Biological characteristics of fish
      4.2.2 Chemical composition
4.2.3 Effects of different post-harvest methods of fish (cold storage, anaerobic condition, drying, etc.)

4.3 Effect on safety and quality of post-harvest practices

4.4 Observation on post-harvest practices in selected wholesale fish markets

4.5 Ethical considerations of post-harvest practices

5. Retail aquatic meat labeling and product traceability

5.1 Labeling laws in relation to food safety

5.1.1 Philippines

(Detection of mislabeled commercial fishery products in the Philippines using DNA barcodes and its implications to food traceability and safety)

5.1.2 Asia-Pacific countries (other examples)

5.1.3 U.S.A.

5.1.4 EU

5.2 Traceability

5.3 Eco-labeling in fisheries products

3.3.1 How ethical is eco-labeling and who benefits?

5.4 Organic labeling

5.4.1 Organic labeling in U.S.A.

5.4.2 Common standards for organic aquaculture on EU

6. International and National Laws affecting Aquatic Meat Production

7. Case studies

7.1 Case Study on the application of technology to monitor environmental status of Seven Lakes in Laguna, Philippines and its impact to the people in the community

8. Ethical worldviews and their influence on the decisions related to the consumption of intensively produced aquatic meat

8.1 Ethical issues in aquaculture intensification

8.2 Animal welfare

9. Discussions and Policy Options

10. Conclusions

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