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DNA Sampling

USE OF GENETICS IN VERIFICATION OF SPECIES IDENTIFICATION AND LEGAL ORIGIN DURING TRADE OF SOUTHERN BLUEFIN TUNA

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Abstract

Genetics offers a powerful tool to complement other Monitoring, Control and Surveillance (MCS) techniques as it allows reliable species identification at any stage of the supply chain. It may also be used to discriminate legal and illegal SBT.

遺伝子技術

遺伝学はそのほかのモニタリング・コントロール及び監視 (MCS)の技術を補完する強力なツールである。さらに、合法的・非合法的 SBT を区別することにも使用できる。

Introduction

1. There are two key questions that must be answered in order to effectively monitor the trade of Southern Bluefin Tuna (SBT) from the point of capture through to the point of sale to consumers. These are:
 - a) Is it SBT?; and
 - b) Was it legally caught?
2. Modern genetic techniques have the potential to cost-effectively answer both of the questions and when combined with appropriate audit trails and inspections it can provide a powerful tool in a reliable monitoring and compliance scheme.
3. Genetic testing is already a requirement in the Australian SBT quota management arrangements (see below) and has been considered by other regional fisheries management organisations as a tool for monitoring catch of tuna species

Is it SBT?

4. Most experienced fishers and trained fisheries officers can discriminate between unprocessed SBT (*Thunnus maccoyii*) and most other species of tuna except Atlantic bluefin, *Thunnus thynnus* and Pacific bluefin *Thunnus orientalis*. Bluefin tuna in excess of 300kg can be identified as being either Atlantic or Pacific bluefin (i.e. not SBT) as such fish would exceed the maximum recorded size of SBT.
5. Experienced fish biologists can morphologically discriminate between the three species of bluefin tuna at all sizes (with some uncertainty) while fish are unprocessed (i.e. whole with gut and gills *in situ*). However, once the fish is processed, species

identification becomes increasingly uncertain as the level of processing progresses. For example, two of the key features used to discriminate SBT from the other bluefin tuna species are the colour patterns of the liver and the number of gill rakers. Once these are removed (e.g. when a fish is gutted and gilled), species discrimination becomes much more uncertain. Species discrimination without the use of genetics is almost impossible from loins and fillets.

6. Modern genetic techniques, using species-specific markers and probes, are powerful and cost-effective tools in the reliable identification of SBT. At present in Australia, all bluefin are considered SBT for the purposes of compliance with individually transferable quotas unless genetic tests are undertaken (at the expense of the fisher) to verify that fact that the fish is not an SBT (i.e. quota is decremented for all bluefin unless the genetic test shows that the specimen is not an SBT).

Was it caught legally?

7. Beyond discriminating between species, forensic genetic techniques (genetic ‘fingerprinting’) have the ability to discriminate between individuals of the same species. Hence, it may be feasible to use forensic genetics to discriminate between legal and illegal SBT at any point between capture and retail sale by taking samples from all legally caught SBT and using these as a basis for genetic ‘finger-print’ comparisons to samples collected from elsewhere in the supply chain.

How much would it cost?

8. At this stage, we have not attempted to design a genetic sampling and testing system for the CCSBT. The specific design should be part of an integrated MCS approach. Until there is further development of the MCS system for the CCSBT it would be impossible to cost a genetic component. Specific genetic probes to identify SBT and northern bluefin have been developed and used by CSIRO.

Additional Benefits

9. In addition to providing a powerful component within a broader monitoring and compliance framework, genetic sampling provides considerable potential as a scientific tool for the estimation of fishing mortality rates and population size both alone and in conjunction with conventional tagging studies. Hence, such applications with further improve the cost-effectiveness of genetic approaches to MCS.

IWC Resolution 1997-2

Resolution on Improved Monitoring of Whale Product Stockpiles

RECOGNISING the progress in establishing reliable techniques for identifying the origin of whale meat and whale products, including the species and geographic stock of origin and individual identification of legally obtained and marketed whale products, through DNA testing and genetic analysis;

NOTING the recent accomplishments of Japan, Norway and the United States in the establishment of reference sets of 'type species' of cetacean DNA sequences for use in addressing the problems of unreported bycatch and illegal trade by determining the source species and geographic origin of such products and the development of market survey programmes utilising DNA testing by some member governments;

RECOGNISING that some whale products legally sold in the domestic markets of some countries are from sources (such as frozen stockpiles and fisheries bycatch) that are not systematically sampled, making it difficult for fisheries personnel to develop market survey programmes to determine the origin of whale meat sold commercially;

RECOGNISING FURTHER that CITES has called upon member nations to report on the status of stockpiles of whale meat, in order to facilitate the monitoring of illegal trade, and has invited all countries concerned to co-operate in determining the sources of whale meat in cases of smuggling or unknown identity;

NOW THEREFORE the International Whaling Commission:

ENCOURAGES all Contacting Governments to provide information to the IWC about the size of remaining stockpiles and the species of origin of meat remaining in stockpiles, and to collect and inventory skin or meat samples for DNA identification from all whales that enter into commerce, and to make the DNA database available to the IWC;

REQUESTS that the IWC Secretariat forward to the CITES Secretariat this Resolution and this year's reports of the Infractions Sub-committee and the Scientific Committee.