



SOLUTION - For facilitators' use

Use the following ideas to propose solutions on root causes identification and options to reduce losses and waste. During the plenary, you could start bringing participants' attention to the need for a more detailed flow chart to identify the generation sources of waste streams. Try to build a better diagram of inputs and outputs with the participation of all trainees. After that, participants can start providing their ideas from the grouping discussion using the fishbone diagram.

Example of information which can be found in resource efficiency specific manuals

Examples of causes of losses:

- low quality of input fish (too little ice utilised within previous steps)
- raw material with high content of fat
- equipment design causing losses, no capture of organic matter and oil
- poor temperature/cooking cycle operational control
- poor maintenance

Examples of improvement options:

- Use enough ice to secure product quality (avoid off specification which is not only result of overcooking)
- Valorisation of organic waste – production of oil and fish meal (through pressing and drying)
- The cooking water can be reused repeatedly if the oil is skimmed off and the oil can be sold for fish oil production. The capital investment required for this option is low.
- Cookers should be insulated, and designed so that steam loss is minimised. Installation of a damper in the exhaust of the cooker, combined with automatic or manual control, can also be effective in reducing steam losses.
- As an alternative, microwave cooking has been introduced in some plants for pre-cooking processes. The investments required are high, but water consumption is almost eliminated and energy consumption is reduced considerably, especially for fish in tall cans. Microwave cooking may increase product yield, but the process needs careful examination before changes are implemented because it may change the quality of the product.
- Skimming of the oil from the cooking liquors will increase the income from selling the oil. This requires no investment, only a change in working procedures. The aqueous phase left after oil skimming can be used for production of fish soup.
- As liquid is drained off it should be collected in a storage vessel. The liquid is warm, so the oil separates easily and can be removed from the surface by scraping or suction. This can significantly reduce the pollution load of wastewaters generated from the processing of oily species, and the oil can be sold as fish oil. It is much more efficient to recover the oil from the liquid immediately after draining, rather than at a later stage, as some of it will be emulsified in the water. For large-scale production it is possible to use a centrifuge to separate the oil, but the investment required is high and requires large volumes to be cost effective.

Source: Cleaner Production in Fish Processing (UNEP manual)