

Impacts of Harvests and Post Harvest Processing Methods on Quality and Value of Bêche-de-mer in Fiji Islands

Ravinesh Ram^a, Kim Friedman^b and Milika Naqasima Sobey^c

^{a, c} Faculty of Science, Technology and Environment, University of the South Pacific, P.O. Box 1168, Suva Fiji Islands

^b Principal Research Scientist, DEC Marine Program, Western Australia

^a ravineshram@gmail.com; ^b jesswillow@gmail.com; ^c sobey_m@usp.ac.fj

ABSTRACT

There are at least 18 commercial species of bêche-de-mer harvested in Fiji. The main target species are *H. fuscogilva*, *H. whitmaei* and *H. scabra* although *H. scabra* is currently banned from export in Fiji. This study examined the impacts of processing methods on quality and value of bêche-de-mer in Fiji Islands. The findings revealed that poor processing methods contributed significantly to value loss of dry bêche-de-mer product. The knowledge and poor understanding of processing techniques by the fishermen is a key factor linked to loss in value. First boiling after harvest, improper cutting/gutting, smoke curing and harvesting of undersized species were identified to be the main problematical areas of processing leading to revenue losses. Sea cucumber species *H. fuscogilva*, *Stichopus hermanni* and *S. cholonotus* were found to be the more difficult species to handle post capture and for processing. Poor quality products traded by the fishermen resulted in the fishermen obtaining a difference in value of almost 20–30% of the maximum price offered for well-processed products. This research raised concerns for over the lack of general awareness and information on improvements in processing techniques at fisher level and sea cucumbers general significance in the coastal ecosystem. Knowledge of the reproductive biology of commercial sea cucumber species and effective management is essential for future sustainability of bêche-de-mer production in Fiji Islands.

Keywords

Bêche-de-mer, Sea cucumber, Processing, Value, Quality, Management

1. INTRODUCTION

Bêche-de-mer fishery is one of the important sources of income for local communities dwelling in coastal areas in the Pacific [1]. This fishery and trade was established when Fiji's sandalwood trade declined [2]. Holothurians or sea cucumber are consumed, generally by Asian communities as a delicacy and for its medicinal properties. The intercontinental trade of its dry form is recognized as bêche-de-mer (*iriko* in Japanese, *hai – som* in Chinese or *trepang* in Indonesian) [3], [4].

From a total of 1200 species known today, approximately 24–35 species are commercially exploited in the markets [5], [6], [7], [8]. Of

these exploited species, the Asian markets target species from the genera *Holothuria* [5] while others are in the genera *Actinopyga*, *Bohadschia*, *Stichopus* and *Thelenota*. *Holothuria* species such as *H. scabra* (Sandfish), *H. fuscogilva* (White teatfish) and *H. whitmaei* (Black teatfish) are among the highest value species [9] demanding superior prices in Asian markets. Well-dried product of 'A' grade would receive a value as high as \$USD 70–190 per kilogram depending on size and quality [10].

Bêche-de-mer processing entails an uncomplicated sequence of actions to turn wet live sea cucumbers into a dry non – perishable commodity. Post harvest steps incorporate first boiling, slitting and gutting, second boiling, smoking and ultimately sun drying [11], [12], [13]. Although these steps are uncomplicated, it requires continuous attention to obtain a standard dry product that is equivalent throughout, of good shape, texture and form. If the steps are not followed appropriately the result of the ultimate grade will be affected thus significantly lowering the value of the final product [11].

Studies carried out in the Verata region of the Fiji Islands revealed that there was a need for enhanced processing techniques of bêche-de-mer [14]. Chinese marine product agents purchasing the products from this region of Fiji have expressed their wish for improvement of bêche-de-mer processing in this and other areas of Fiji as, considerable value was lost through merchandising substandard product. Correspondingly, findings by [5] in Philippines revealed that products that were wet, ill-shaped or half cooked subsequent to processing were classified under reject or class 'B' category and earned locals 40 percent of the maximum price offered by the marine product agents for a well processed product.

2. MATERIALS AND METHODS

2.1 Site of study

The study was conducted in Fiji Islands (Figure 1) in between August 2006 to July 2007.

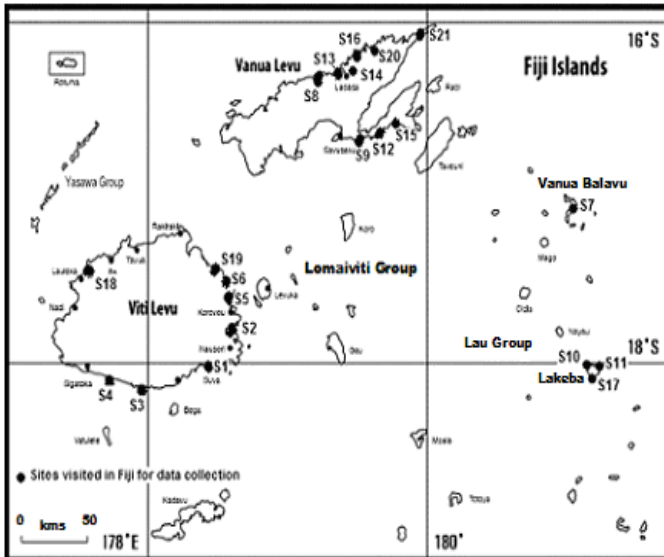


Figure 1. Sites visited in Fiji for collection of data (source: USP media centre)

There were 21 sites chosen from eastern and western Viti Levu, Northern and southern Vanua Levu and two islands from outer Lau group (Vanua Balavu and Lakeba Island). These two islands have two main buyers who are engaged in buying the products from other islands in the Lau group. Therefore the data from the two islands represents the data for the Lau Group. Catch analysis and interview of the fishers was done at the time when the fishers visited the marine product agents on the two islands to sell their products either in raw or dry form. However, the fishers based on the main islands of Fiji were visited directly in their villages and data on harvesting and processing was collected.

2.2 Data collection

Data pertaining to sea cucumber fishery in Fiji was gathered through library and internet research while information on key issues such as processing was acquired through formal and informal interviews and questionnaires given to fishermen at various sites (n = 21) around Fiji, the fisheries officers at the Ministry of Fisheries and Forests and the main exporters of bêche-de-mer. The data that were gathered from the fishers and the marine product agents included the following:

- ❖ Location of harvest
- ❖ Number of hours fished
- ❖ Time/season of harvests
- ❖ Species commonly harvested
- ❖ Method of storage in the sea
- ❖ Processing methods used to process sea cucumber
- ❖ Difficult steps in processing method
- ❖ Species that were difficult to process or handle

Questionnaire forms were prepared and given to the target population. The key population targeted for interviews and catch analysis were the artisanal (bêche-de-mer) fishermen (n = 86), middlemen (n = 8) and the main exporters of bêche-de-mer (n = 5) but for study purpose only one exporter (Star Dragon Co Ltd located in Suva, Fiji) was involved in the entire study. An identification card and sea cucumber pictures were shown to the fishermen and buyers during data collection for sea cucumber identification.

3. RESULTS AND DISCUSSION

Bêche-de-mer is produced through series of steps of converting perishable sea cucumber into a dry product. These steps include first boiling, cutting and gutting, salting, second boiling, smoke drying, third boiling and finally sun drying. The fishers however, use an alternative and a short method to produce the dry product containing quality defects due to inappropriate post harvest handling techniques. The fishers miss fundamental steps that are crucial in producing a good quality bêche-de-mer product. The processing steps are rapidly carried out to make the quickest income as soon as possible [18]. The fishers also found that processing of *Stichopus hermanni* (Curry fish), *S. chloronotos* (Greenfish) and *H. fuscogilva* were some of the difficult species to process. The White teatfish being the high value species was a major problem for maintaining the quality of the final product. The Greenfish and the Curryfish were other two species that were difficult to process by the fishers due to fragile skin and flesh. During first boiling, the flesh of these two species disintegrated. Due to this problem the fishers have minimised the collection of Greenfish and Curryfish. The missing of important steps of processing the sea cucumbers by the fishers has also affected the quality (Figure 2) as well as the value of the dried products in the international markets. The poorly processed bêche-de-mer always has quality issues in the international markets such as:

1. Undersized bêche-de-mer belonging to all species.
2. Products not cut and gutted properly as gut contents are still intact with the dried product.
3. Products when dried do not have proper cylindrical shape since appearance is also a major grade determiner
4. Burnt products.
5. Products are contaminated with sand and dust when packed at the marine product agents' warehouse.



Figure 2: Poorly processed sea cucumbers for export from Fiji Islands

The findings revealed that there were greater percentages of products belonging to low-low medium value species such as Brown sandfish, Curryfish, Amberfish, Tigerfish, Lollyfish and Deepwater redfish having quality issues due to inappropriate processing. Total species affected due to inappropriate post harvest handling affecting the bêche-de-mer product was in the range of 10-45 percent per species. The percentages varied in different parts of the Fiji Islands depending on the processing technique used. Since the fishers were missing the fundamental steps of processing bêche-de-mer, first boiling, cutting and gutting, and drying were some of the major links to greater losses.

High value species that bring more revenue in the country are valued less due to low quality level and are ranked the second best by the international markets. The price obtained by the marine product agents in Fiji also affects the price distributed to the bêche-de-mer fishers locally. There is often a price difference of 10-20 percent on the product price received internationally and 20-

30 percent of the maximum price by the fishers (Table 1). The low grades of the bêche-de-mer are usually in high numbers when the product leaves the shores of Fiji.

4. CONCLUSION

Bêche-de-mer harvesting and processing in Fiji Islands will continue to face the problems with quality issues unless the bêche-de-mer legislations are properly enforced. Bêche-de-mer processing was done rapidly by the fishers to obtain quick money where essential steps were missed that had serious consequences on the quality of the final product. Fishermen found smoke drying and first boiling to be difficult steps of processing that led to poor quality products being produced from Fiji Islands. The final dried end product due to poor method of processing had poor exterior appearance, distorted or twisted shape, particulate matter, sand was present in the gut cavities and most of all spoiled products were high among the fishermen due to improper storage. This reduced the grade of the product from 'A' to grade 'B – D'. Further research stills needs to be done on impacts of processing methods on quality of bêche-de-mer in Fiji Islands. Ways should be found to add value to bêche-de-mer products exported from Fiji Islands. This has also prompted immediate awareness and education for fishermen to improve processing methods and quality of bêche-de-mer in Fiji Islands.

6. ACKNOWLEDGEMENT

The authors wish to thank the Secretariat of the Pacific Community (SPC) for providing the necessary funds to successfully finish the project. The villages and the fishers of bêche-de-mer around Fiji Islands are acknowledged for the necessary information that was provided by them towards the research. The involvement of the official from the Ministry of Fisheries and Forests of the Fiji Islands for providing their necessary support are also acknowledged with gratitude.

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Table 1: Prices paid by marine product agents to the fishers as of July – December 2007.

English name	Fijian name	Grade of product	Price received by fishers Dry per kg (\$FJD)	Price received by fishers Raw per piece (\$FJD)
White teatfish	<i>Sucuwalu</i>	High	25.00 – \$35.00	4.00 – \$25.00
Black teatfish	<i>Loaloa, lolo</i>	High	10.00 – \$20.00	5.00 – \$10.00
Sandfish*	<i>Dairo</i>	High	8.00 – \$15.00	5.00 – \$10.00
Prickly redfish	<i>Sucudrau</i>	Medium	10.00 – \$30.00	3.00 – \$6.00
Stonefish	<i>Dri – vatu</i>	Medium	2.50 – \$10.00	0.20 – \$0.30
Surf Redfish	<i>Tarase</i>	Medium	2.50 – \$12.00	1.00 – \$3.00
Blackfish	<i>Driloli</i>	Medium	2.00 – \$8.00	1.50 – \$3.00
Elephant Trunkfish	<i>Dairo-ni-cakau</i>	Low	7.00 – \$15.00	1.00 – \$2.00
Greenfish	<i>Tarasea</i>	Medium-High	20.00 – \$30.00	-
Curryfish	<i>Laulevu</i>	Low-Medium	10.00 – \$30.00	0.50 – \$1.00
Amberfish	<i>Dri-volavola</i>	Low	7.00 – \$10.00	1.00 – \$2.00
Brown sandfish	<i>Vula</i>	Low	2.50 – \$10.00	0.60 – \$0.80
Deep water redfish	<i>Dri-tabua</i>	Low-Medium	15.00 – \$25.00	1.50 – \$3.00
Lollyfish	<i>Loliloli</i>	Low	0.50 - \$5.00	-
Sea cucumber	<i>Mundra, midro</i>	Low	3.00 - \$10.00	-
Snake fish	<i>Loliloli</i>	Low	0.50 - \$4.00	-
Tiger fish	<i>Vula-ni-cakau</i>	Low-Medium	6.00 - \$12.00	0.30 – \$0.80
Pinkfish	<i>Loliloli</i>	Low	0.50-\$5.00	-