Measuring aquatic food consumption in the first 1000 days of life:
An approach to estimating portion sizes in Timor-Leste

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Measuring aquatic food consumption in the first 1000 days of life: An approach to estimating portion sizes in Timor-Leste

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Photo credits

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Background

Aquatic foods (AFs), including fish, crustaceans, mollusks, echinoderms and seaweed, make a significant contribution to both livelihoods and dietary patterns throughout Timor-Leste. They are a rich source of protein and several important micronutrients, including vitamin A, vitamin B12, iron, zinc, calcium and long-chain omega-3 fatty acids, which are easily absorbed and used by the human body (Farmery and Bogard 2023). These nutrients play a vital role in healthy growth and development during the first 1000 days of life, from pregnancy and lactation to the complementary feeding stage for children aged 6–23 months old. This period is recognized as an important window of opportunity to ensure optimal growth and development and to interrupt the intergenerational cycle of malnutrition (Black et al. 2013).

In Timor-Leste, child and maternal malnutrition is a significant concern, and diets often lack animal-source foods (Bonis-Profumo et al. 2021). National fish consumption rates are much lower than among neighboring nations, though AFs are more widely consumed in coastal areas (AMSAT International 2011). Improving the dietary diversity and nutritional status of women and children is a national priority for Timor-Leste (GoTL 2017), and AFs are well suited to support this goal.

Dietary assessment provides crucial data for understanding dietary patterns as a key driver of nutritional status and associated health outcomes in individuals and populations (Gibson 2005). The quality of this data underpins the development of appropriate policy and program solutions to improve dietary quality and nutrition outcomes. Currently, little is known about the consumption patterns of AFs in Timor-Leste, particularly during the first 1000 days of life. Accurate dietary assessment of AFs is particularly challenging given the high diversity of fish, seaweed and marine invertebrate species consumed throughout the country's coastal areas.

This guide presents an approach to measuring AF consumption in Timor-Leste that was developed by WorldFish in collaboration with the Commonwealth Scientific and Industrial Research Organisation (CSIRO). The guide attempts to capture consumption patterns in the first 1000 days of life among fishing communities in Timor-Leste and is aimed at government, development and research partners and practitioners who may wish to adapt and apply such methods to further understand AF consumption patterns in other contexts.

Photo credit: Miadhna Bunce

Sampling of *Lambis lambis* for measurement of flesh consumed and nutritional analysis.

Dietary assessment

Several standardized and validated dietary assessment tools exist, including the weighed food record, the 24-hour recall method and the food frequency questionnaire. Each has its advantages and limitations, depending on the specific purpose of assessment (FAO 2018).

The weighed food record is considered the "gold standard" for estimating food and nutrient intake (Gibson 2005). It involves the participant weighing each food and beverage prior to consumption while also recording details of brands and preparation methods for a defined period, such as 1 day or 1 week depending on study objectives. Although highly accurate, this method requires a high level of literacy among respondents and significant resources to implement.

The 24-hour recall method is a commonly used retrospective method that involves a trained interviewer asking a participant to identify all foods and beverages consumed within the previous 24 hours and can additionally include recording of the quantities consumed (FAO 2018). It reflects a snapshot in time when used in a small sample but can be repeated on several days of the week or over different seasons to capture usual intakes. A limitation of retrospective methods is that foods consumed are self-reported, thus prone to recall error.

The food frequency questionnaire (FFQ) is another retrospective method that captures information on the consumption frequency of foods on a predefined food list over a defined period, such as the previous week or month (FAO 2018). The quantitative FFQ additionally captures portion sizes, which together with frequency of consumption can be used to estimate quantities of usual intakes. This method has the advantage of capturing usual intake, rather than simply a snapshot of intake. It is also relatively low burden on respondents compared to other methods, such as the 24-hour recall.

A grandmother and mother feed fish with rice and vegetables to their child.

Overview of the survey approach

Together, WorldFish and CSIRO, with the support of the Directorate General of Fisheries, Aquaculture and Marine Resources of the Timor-Leste government, have developed a quantitative FFQ designed specifically to capture AF consumption in Timor-Leste. The approach includes a survey module and two visual aids to help participants accurately recall both the type and quantity of AF consumed: (1) a species identification tool (Appendix 1) and (2) a portion size estimation tool (Appendix 2). A conversion table of raw portion weights is then used to convert the portions from the visual aid into estimated quantities consumed (Appendix 3).

Using the species identification tool

The survey begins by asking for consent from participants and collecting basic demographic details. Respondents are then asked: *Did you consume any fresh fish in the past month?* If respondents answer, yes, they are then asked *How frequently did you consume fresh fish?* The species identification tool is shown to respondents, who then mark the relevant foods consumed on the tool with a removable marker (Appendix 1). This step makes the process more participatory and engaging for the participant. More detailed information is then asked about each individual AF, as shown in Table 1. This includes the frequency of consumption, the source of the AF (such as from fishing activities, gleaning, markets or mobile vendors), the transaction mechanism (such as whether the AF was purchased, traded or sourced from own labor), and the portion size when it was most recently consumed. To make the recall process more manageable, respondents are first asked about their consumption of fresh fish species, then shellfish species and, lastly, processed AFs such as tinned fish or dried fish. After each group of AFs from the list has been identified, participants are asked whether they have consumed any other AFs that are not in the tool. If so, the type is recorded.

Validation of species included in the identification tool in Adarai.

A recall period of 1 month was selected to capture the importance of gleaning activities to dietary intake. Gleaning activities can take place around 8 times per month depending on the tides, in turn associated with the moon cycles (stronger tides occur during the days around full and new moons). Although a shorter recall period of 7 days or fewer can lower recall bias (FAO and World Bank 2018), these shorter periods would likely underestimate the contribution of these diverse aquatic foods to diets.

Using the portion size estimation tool

To help participants estimate the portion size, they are shown the portion size tool (Appendix 2). They are asked to select (1) the type and size that best represents the species they consumed based on body shape or form of the AF (species portion code), and (2) the specific portions of the AF they consumed (individual portion code/s).

If the respondent chooses two portions from the photo, the enumerator must enter both corresponding letters (e.g. A+B). If the portion is larger than what was consumed, a portion can be divided (e.g. D/2). If the respondent consumed several units of a given food, such as clams or sea snails, the units can be multiplied (e.g. Ux3). For foods typically served in tablespoons (e.g. a whole octopus may be chopped and shared among household members), the respondent can indicate the number of tablespoons consumed (e.g. Tx2).

The enumerator then uses a separate table of weights to convert these portion codes into the quantity consumed in grams and enters this into the data entry field for portion weight (g) (Appendix 3). This can either be done directly at the time of data collection or later such as at the end of the day. However, it is recommended that this be done prior to data analysis as a quality check of the calculated portion size. The total quantity of AFs consumed per person will then be calculated during analysis, using the frequency of intake multiplied by the individual portion at the time of most recent consumption.

Photo credit: Kate Bevitt/WorldFish

Dried fish for sale, Atauro Island, Timor-Leste.

Consumption of fresh fish/shellfish/processed fish	
Did you consume any [fresh fish] in the past 1 month? If yes, how frequently did you consume [fresh fish]? (select one)	Which [fresh fish] did you consume in the past 1 month? (species identification tool)
☐ Never ☐ Rarely (<1 month) ☐ 1–3 times/month ☐ 1–2 times/week ☐ 3–4 times/week ☐ Daily	

For each individual [fresh fish] identified as consumed by the participant in the past 1 month, the following questions are then asked:

Frequency How frequently did you consume this food? (select one)	**Source** Where did you source/procure this food from? (multiple choices)	**Transaction mechanism** How did you acquire it? (multiple choices)
☐ Never ☐ Rarely (<1 month) ☐ 1–3 times/month ☐ 1–2 times/week ☐ 3–4 times/week ☐ Daily	☐ Fisheries ☐ Gleaning/shore caught ☐ Ponds/aquaculture ☐ Fisher ☐ Aquaculture farmer ☐ Roadside vendor ☐ Mobile vendor ☐ Local market ☐ Central market (outside village) ☐ Canteen/kiosk ☐ Store ☐ Restaurant ☐ Celebration/community gathering ☐ Family/community member ☐ Other If other, please specify	☐ Own production/harvest ☐ Purchased ☐ Traded/bartered ☐ Gifted ☐ Shared If traded/bartered, what was the food exchanged for?

Portion

Please estimate how much you ate of this food the most recent time you consumed it.

Species portion code	Individual portion code/s	Portion weight (g)
_____	_____	_____

Table 1. Survey module capturing frequency and quantity of AF consumed in the past month.

Fish species consumed

☑ ■ F15 – Paddletail snapper

Frequency How frequently did you consume this food?	**Source** Where did you source/procure this food from?	**Transaction mechanism** How did you acquire it?
☐ Never ☐ Rarely (<1 month) ☑ 1–3 times/month ☐ 1–2 times/week ☐ 3–4 times/week ☐ Daily	☐ Fisheries ☑ Gleaning/shore caught ☐ Ponds/aquaculture ☐ Fisher ☐ Aquaculture farmer ☐ Roadside vendor ☐ Mobile vendor ☐ Local market ☐ Central market (outside village) ☐ Canteen/kiosk ☐ Store ☐ Restaurant ☐ Celebration/community gathering ☐ Family/community member ☐ Other If other, please specify	☑ Own production/harvest ☐ Purchased ☐ Traded/bartered ☐ Gifted ☐ Shared If traded/bartered, what was the food exchanged for?

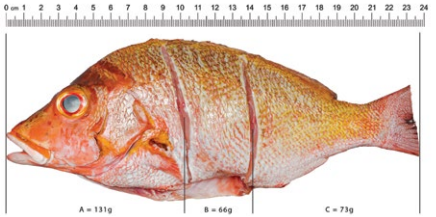
Portion

Please estimate how much you ate of this food and the most recent time you consumed it.

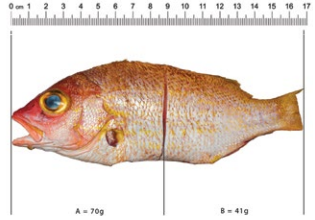
Species portion code	Individual portion codes	Portion weight (g)
■ F16	A+B	111

Note: In this case, after being shown the species identification guide, the respondent said they had consumed the paddletail snapper (F15). To estimate the portion size, seaperch (F16) was used from the portion guide, as it is similar in shape to the paddletail snapper and the size consumed by the respondent was more similar to the seaperch portion.

Table 2. Example of a completed survey module for one fresh fish species.



■ F15 - Ikan Mean/Kamera - Paddletail Snapper



■ F16 - Ikan Kinur - Seaperch

Development of the species identification tool

The final list of AFs included in the FFQ was selected to reflect the most commonly consumed AFs in the focal communities where the survey was implemented. The aim was to strike a balance between sufficient detail to capture the foods of interest while limiting the burden on participants and enumerators. A preliminary list of AFs was developed based on AF diversity assessments and municipal catch data records produced by WorldFish and the Ministry of Agriculture and Fisheries (MAF) during the previous eight years. In Timor-Leste, near real-time catch data is available at https://timor.peskas.org. Next, the preliminary list was presented and reviewed by local experts, including village leaders and fisheries officers. The list was then further validated with local fisherfolk in each focal community. The final list was cross-checked with scientific databases to ensure correct species identification (FishBase, SeaLifeBase, WoRMS).

At each stage, the emphasis was placed on AFs that are commonly consumed as opposed to species that might be important for other purposes, such as livelihoods or income generation. For example, when Spanish mackerel and large tunas are caught, these are typically sent to urban markets aimed at high-income consumers and not commonly consumed in the local community. Similarly, several species of shelled mollusks are harvested for the shell rather than the flesh. These species are sold as ornaments and handcraft in local markets but are not commonly consumed. Given the focus on consumption patterns, such species were excluded from the final list of AFs.

The final list covered 61 foods: 24 fresh fish, 23 shellfish, 3 seaweeds and 11 processed AFs (including tinned, dried and smoked fish).

Validation of species included in the identification tool in Ililai.

Local fisherwoman and interns from the Universidade Nasional Timor Lorosa'e (UNTL) undertaking measurements of marine invertebrate species.

Development of the portion size estimation tool

Use of aquatic foods photographs and household utensils

Visual aids are an important tool used to help participants accurately recall the quantity of foods consumed (Gibson 2005). There are several factors to consider when developing a visual tool for a particular context. These include the use of foods or common household utensils such as plates and spoons, whether to show raw or cooked foods, the number of food types to include, and the process by which the tool is then used to convert a visual portion into a quantity in grams. Given the diversity in shapes and sizes of commonly consumed AFs in Timor-Leste, it was determined to use a combination of photographs of AFs as well as some common household utensils, such as a tablespoon.

Using raw portion sizes

Showcasing cooked AF portions has some advantages, such as being easier for respondents to estimate the amount consumed if they did not prepare the food. However, it comes with logistical challenges, such as presenting the same AF prepared in multiple ways as per common practices. For example, trevally can be prepared as both fish curry and fried fish, which are visually very different. Moreover, during data analysis many surveys convert as-consumed weights back to raw weight to quantify consumption (EPA 2016). In this case, the target respondents of the survey were women of reproductive age, who are likely to be the ones who acquired the AF and prepared it. Therefore, the tool developed here focuses on raw foods and some commonly processed foods such as canned or dried fish, similarly to other visual aids developed by WorldFish in other contexts (Bogard et al. 2017).

Using common aquatic food shapes and sizes

It was considered overly cumbersome to include all AFs from the identification aid in the portion guide given that many species are of a similar size and weight. As such, a selection of AFs based on common shapes and sizes was included in the portion guide. For each body shape, an AF that could represent a range of species of a similar shape was included in the portion estimation guide. For example, long tom was selected to represent fish with an elongated body shape. For AFs commonly available and/or consumed in multiple sizes (such as adult and juvenile fish of the same species), multiple sizes were included in the portion guide.

Sample preparation and photography

Fish and cephalopods were purchased in markets or directly from fishers. The length and weight of the whole AFs (total weight) was recorded. For shellfish, selected species were harvested and the total weight of each specimen was registered. Then, scales, viscera, shells and other non-edible parts were removed from the selected AFs to obtain the edible parts. The length and the weight of the raw edible clean AF was then recorded. Specimens were cut into commonly consumed portion sizes based on local practices. Portions were then photographed with a 10 mm gridded background, and the weight of each individual portion was recorded. A selection of commonly consumed processed fish, such as canned and dried fish, was also included. These items were presented on a standard plate alongside a standard tablespoon as a size reference.

Conversion of portion sizes to weights

A conversion table was produced for the enumerator to use to convert the portion that consumers reported into a weight in grams. This table included the whole length and weight of each species (prior to cleaning), raw edible weight (after cleaning to obtain edible parts) and raw edible portion weights for each AF (Appendix 3). Note that the raw edible portion weights for fish species include bones. Depending on the species and local preferences, the bones may be considered edible or may end up as plate waste. In such cases, a further conversion factor to adjust for plate waste can be used to more accurately estimate consumption. Depending on the purpose of analysis of consumption data, it may also be appropriate to convert all portions such as dried or processed AFs to raw weight equivalents using standard conversion factors (EPA 2016). Ideally, the portion weights presented in the conversion table should reflect an average weight of several replicate samples. In this case, because of logistical challenges, the fresh fish portion weights presented were obtained from a single fish only. For shellfish, the weights reflect an average of 20 to 30 individual specimens per species. Similarly, all tablespoon weights reflect an average obtained from several repeated measurements.

Printing the tools

The species identification aid was printed and laminated in A3 size. The portion size guide was printed in landscape A4 booklet format and laminated, with each portion size printed at a 1:1 scale and presented alongside a ruler. The largest AFs were presented across two landscape A4 pages. Both tools were presented with species in the same order, as per the survey questionnaire.

UNTL student measuring the size of the edible gastropod *Lambis lambis*.

Future applications

The tools presented here were trialed and then used in a survey of approximately 440 households in four coastal communities in Timor-Leste as part of the Nutrition-Sensitive Fisheries Management project.

This survey was designed to capture consumption patterns during the first 1000 days of life. As such, it targeted women of childbearing age who were either pregnant or lactating, or who were between 15 and 49 years old. The survey also captured consumption patterns among infants and children aged 6 months to 5 years old by repeating the survey module with the primary caregiver of the child. Although children aged 2–5 years old are outside the first 1000-day window, this age group was included in the survey to further understand intra-household food distribution and the transition from complementary foods to adult diets. This survey approach can also be used among other population groups, such as women and men over the age of 15. It can also be replicated among multiple household members to enable understanding of intra-household distribution of AFs. The survey can be done at a single point in time or repeated at two or more time points throughout the year to capture seasonal variations in consumption patterns. It can also be collected alongside other survey modules such as fishing, gleaning and livelihood activities, household food security and individual dietary diversity.

If using this survey approach and visual aids in other settings or among other population groups, it is recommended that the tools be adapted accordingly. Firstly, the list of foods to be included should be modified to reflect those commonly consumed in the target community. This can be done through consultation with local community members and/or local nutrition or fisheries experts. The final number of AFs will depend on the diversity of foods commonly consumed and the specific objectives of the survey while taking into consideration resource limitations and enumerator and respondent burden from data collection.

Secondly, the species identification and portion size tools should be modified to reflect the AFs that are the focus of the survey. Care should be taken to ensure portions presented reflect common local practice in the way that AFs are typically consumed among the target group.

This step was particularly challenging in Timor-Leste as many species commonly consumed by coastal communities are sourced through their own gleaning activities. These species are not commonly available in markets and were logistically challenging to source directly from gleaners as their collection is dependent on moon and tide cycles. Furthermore, obtaining raw edible parts of shellfish to populate the conversion table for portions to weights (Appendix 3) was very labor intensive. These species are normally cooked in their shells which allows for easy removal of the non-edible parts after cooking. However, in order to obtain raw edible parts, the non-edible shells and other parts needed to be removed without cooking. This was a challenging and time-consuming manual task that required skilled input from multiple community members and staff. An alternative approach for future applications could be to obtain the cooked edible parts according to normal practices (such as steaming the shellfish to open them) and then use an established conversion factor to estimate the raw weight equivalent.

Thirdly, the survey module and tools should be pilot tested among the target group to ensure appropriateness of the AF list, and relevance of the tools. Enumerators should be trained in advance by personnel with expertise in collecting dietary data and given the opportunity to practice applying the survey module and using the tools. It is also recommended that the proposed survey and tools be further tested and validated as accurate and reliable methods to measure AF consumption.

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Appendix 1. Species identification tool

F1 - Kombong - Mackerel scad

F2 - Salar Matan Boot - Scad

F3 - Samber - Garfish

F4 - Ikan Terbang/Manu - Flying fish

F5 - Sardina - Sardine

F6 - Ikan Daun - Longtom

F7 - Tongkol - Tuna

F8 - Bainar Mean - Dark-banded fusilier

F9 - Bainar Boot - Blue fusilier

F10 - Kitan - Spinefoot

F11 - Kafir - Surgeonfish

F12 - Niru - Parrotfish

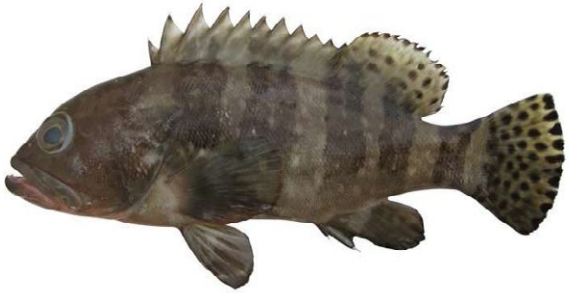
F13 - Ikan Kulit Toos - Triggerfish

F14 - Baduma Rai-henek - Ornate emperor

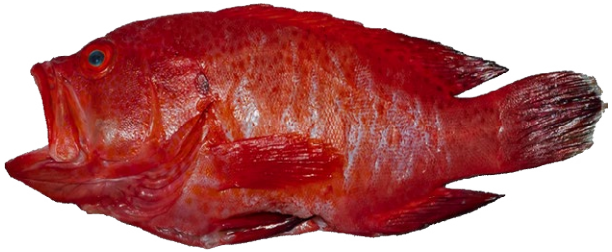
F15 - Ikan Mean/Kamera - Paddletail snapper

F16 - Loran Kinur - Seaperch

F17 - Inasivit - Hogfish

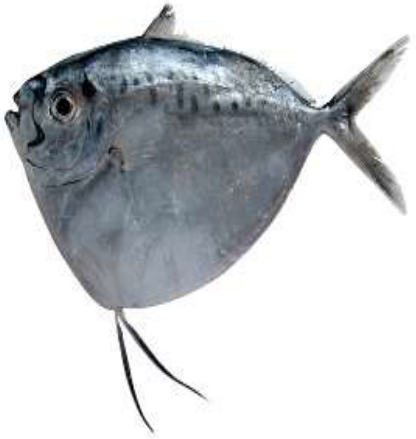


F18 - Garopa/Saukoto - Rockcod



F19 - Garopa Mean - Red rockcod

F20 - Bete-bete Debedoor - Ponyfish



F21 - Kakehe - Moonfish

F22 - Saltaun/Kase in - Mullet

F23 - Ikan Koku - Trevally

F24 - Ikan Nila - Tilapia

A1 - Kurita - Octopus

A2 - Suntu - Squid

A3 - Boek tasi boot - Lobster

A4 - Boek tasi - Shrimp

A5 - Boek mota - River prawn

A6 - Kadiuk - Crab

A7 - Fahi fulun - Sea urchin

A8 - Mechi - Seaworm

A9 - Budu tasi - Green seaweed

A10 - Budu tasi kinur - Yellow seaweed

A11 - Asu liman - Button seaweed

S1 - Siput - *Asaphis violascens*

S2 - Siput - *Codakia tigerina*

S3 - Siput - *Hippopus hippopus*

S4 - Siput - *Spondylus* sp

S5 - Siput - *Tridacna squamosa*

S6 - Siput - *Tridacna cf crocea*

S7 - Siput - *Angaria cf delphinus*

S8 - Siput - *Cerithium nodulosum*

S9 - Siput - *Conomurex luhuanus*

S10 - Siput - *Conus capitaneus*

S11 - Siput - *Lentigo lentiginosus*

S12 - Siput - *Cypraea tigris*

S13 - Siput - *Gibberulus gibberulus gibbosus*

S14 - Siput - *Lambis lambis*

S15 - Siput - *Nerita polita*

S16 - Siput - *Tectus niloticus*

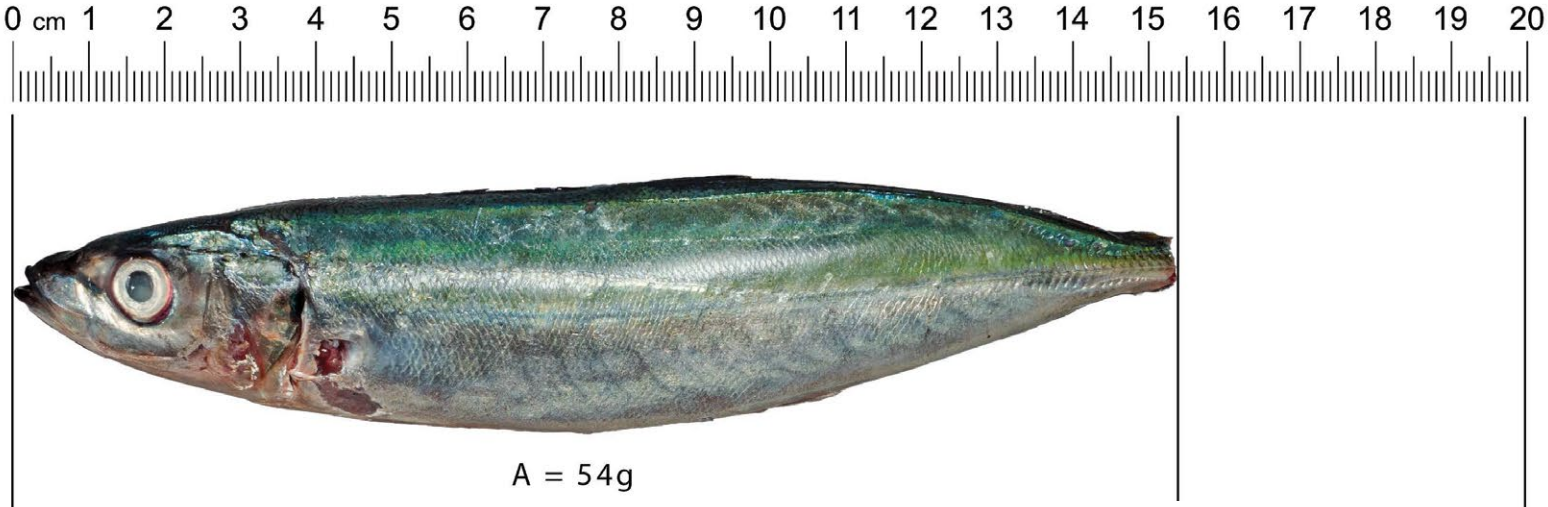
S17 - Siput - *Vasum turbinellus*

S18 - Siput - *Turbo setosus*

S19 - Siput - *Tectus pyramis*

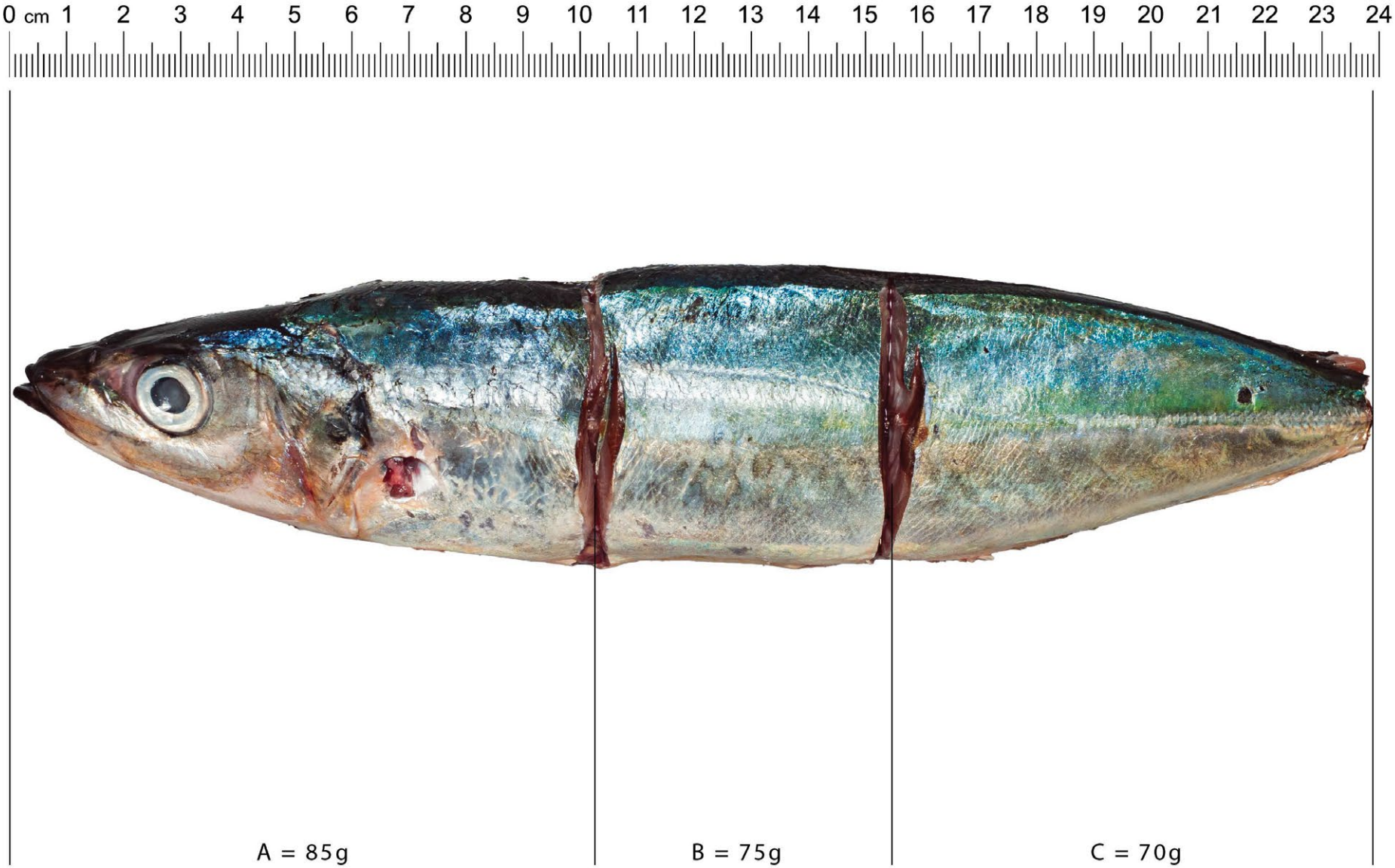
Appendix 2. Portion size estimation tool

F1.1 - Kombong - Mackerel scad | Extra Small | Total Weight = 57g

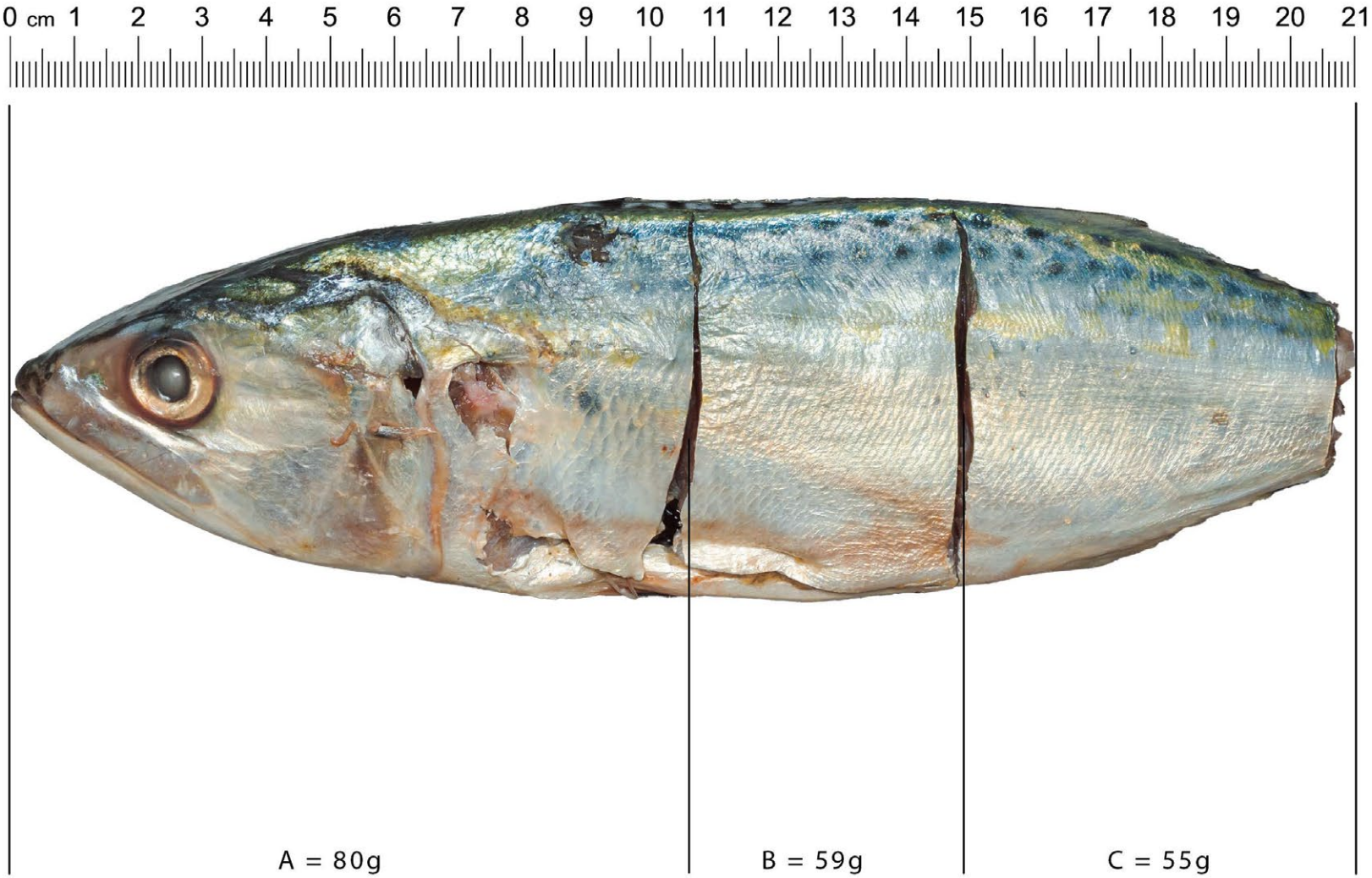


F1.2 - Kombong - Mackerel scad | Small | Total Weight = 124g

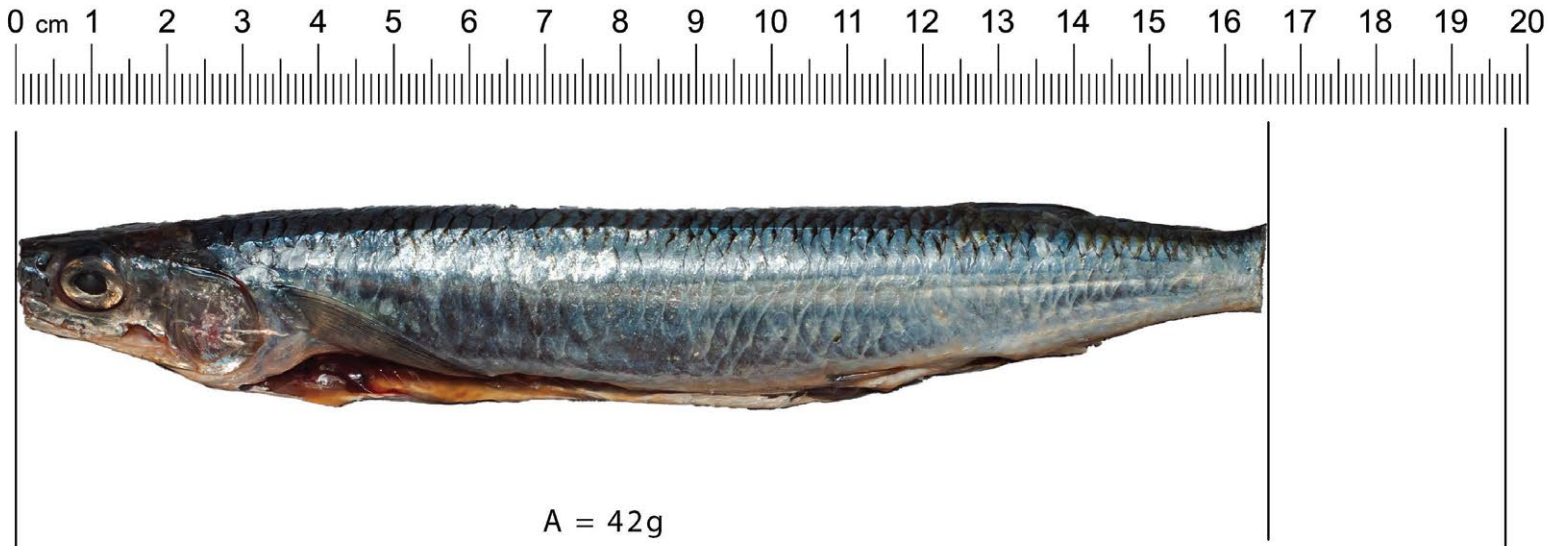
F1.3 - Kombong - Mackerel scad | Medium | Total Weight = 244g



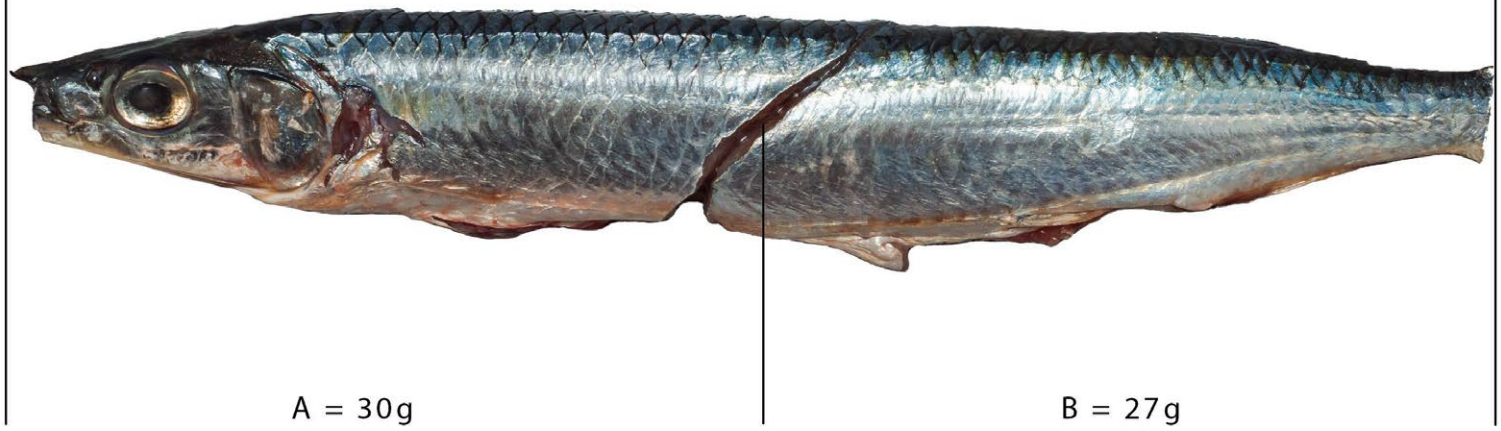
F2 - Salar Matan Boot - Scad | Medium| Total Weight = 219g



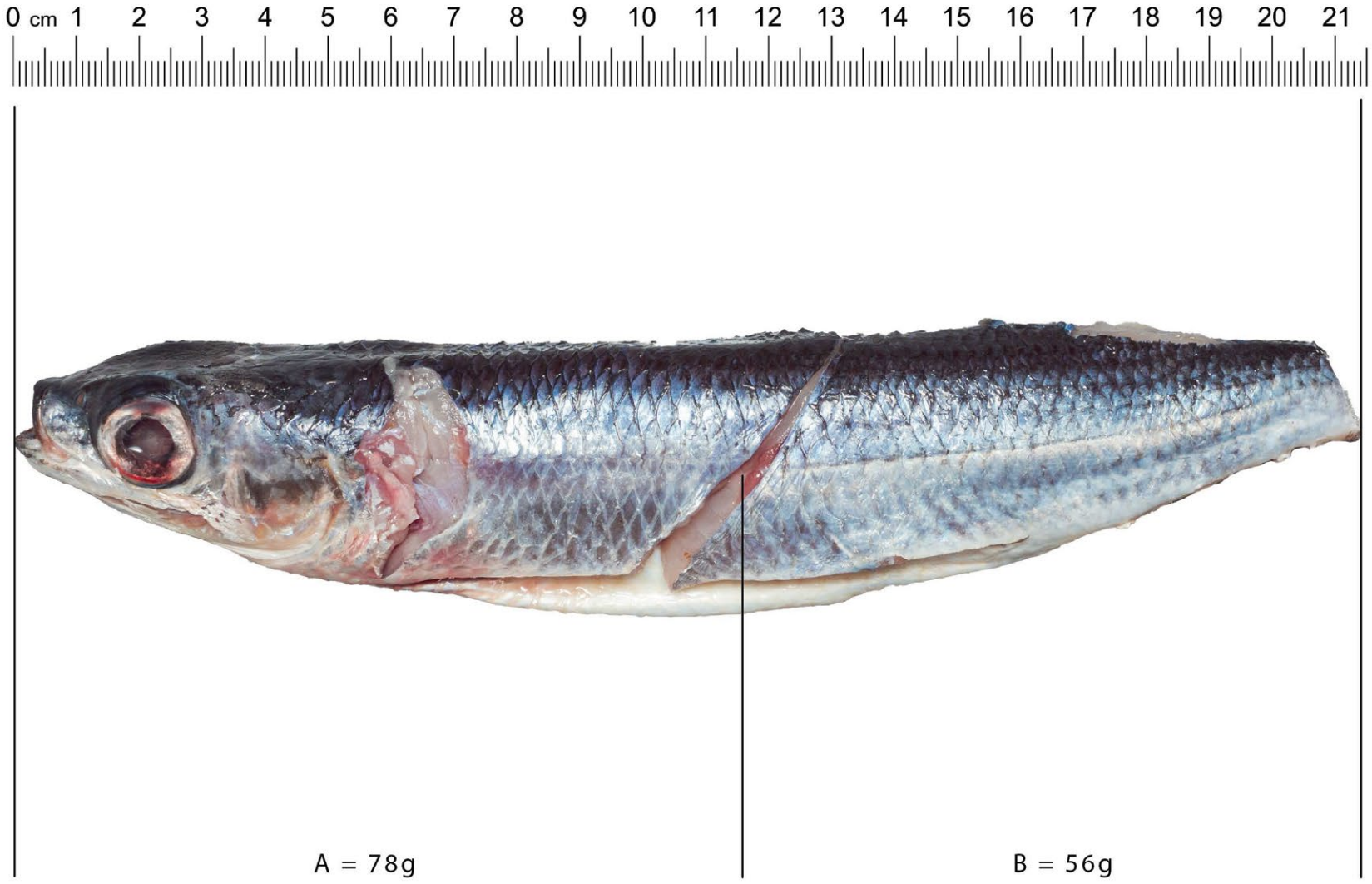
F3.1 - Samber - Garfish | Medium| Total Weight = 46g



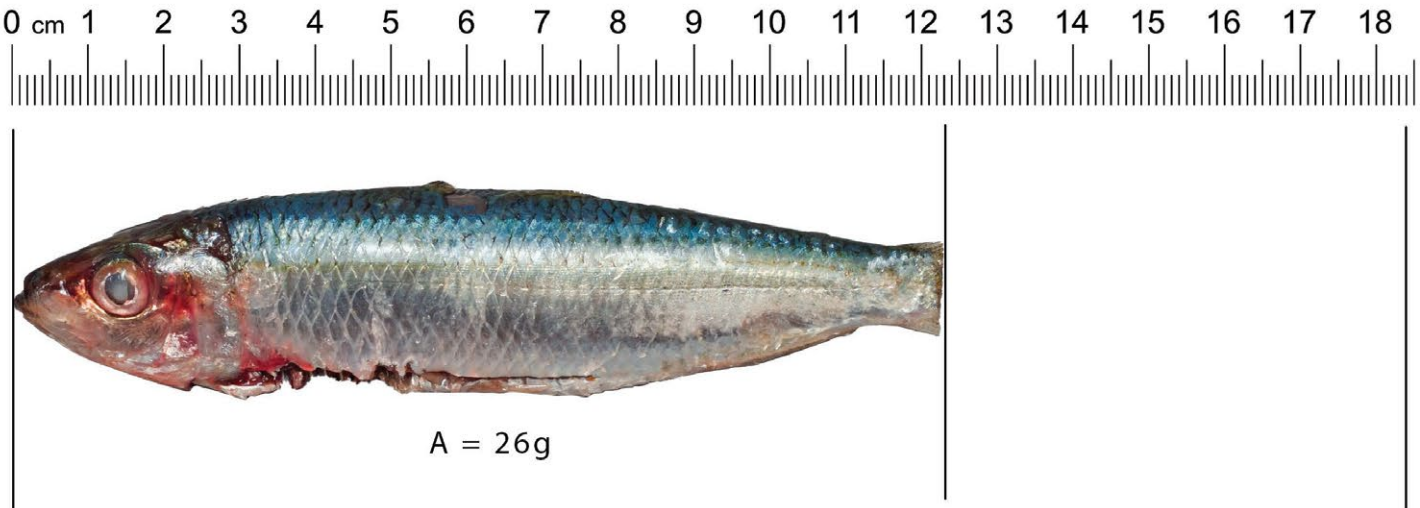
F3.2 - Samber - Garfish | Large | Total Weight = 67g



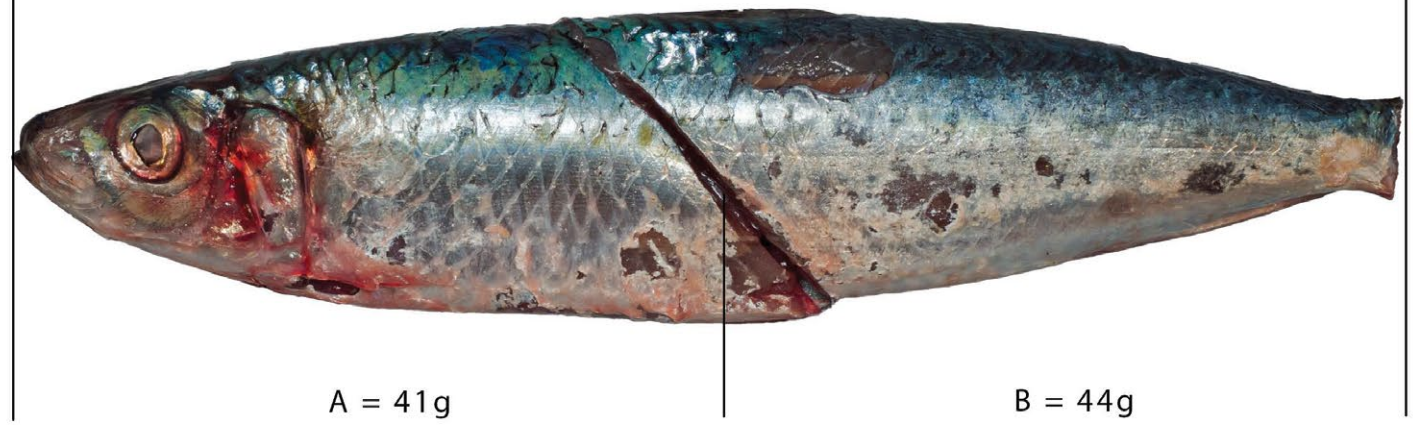
F4 - Ikan Manu - Flying Fish | Large | Total Weight = 153g



F5.1 - Sardina - Sardine | Small | Total Weight = 28g



F5.2 - Sardina - Sardine | Large | Total Weight = 97g

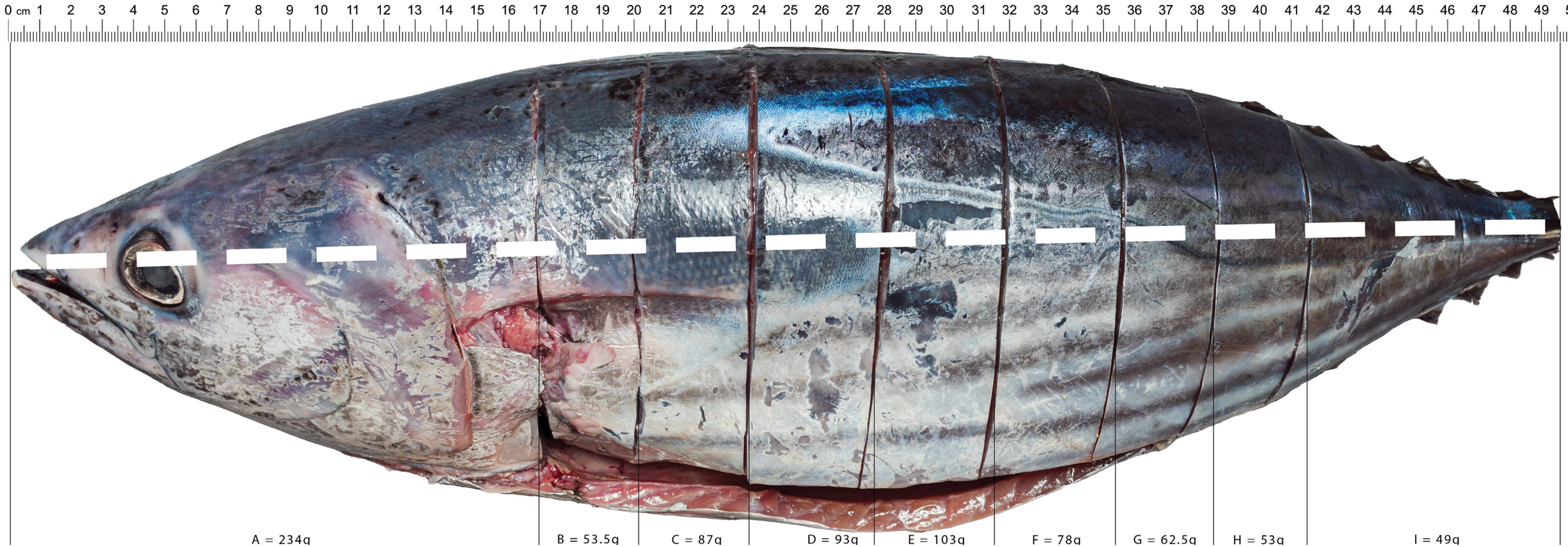


F6 - Ikan Daun - Longtom | Medium

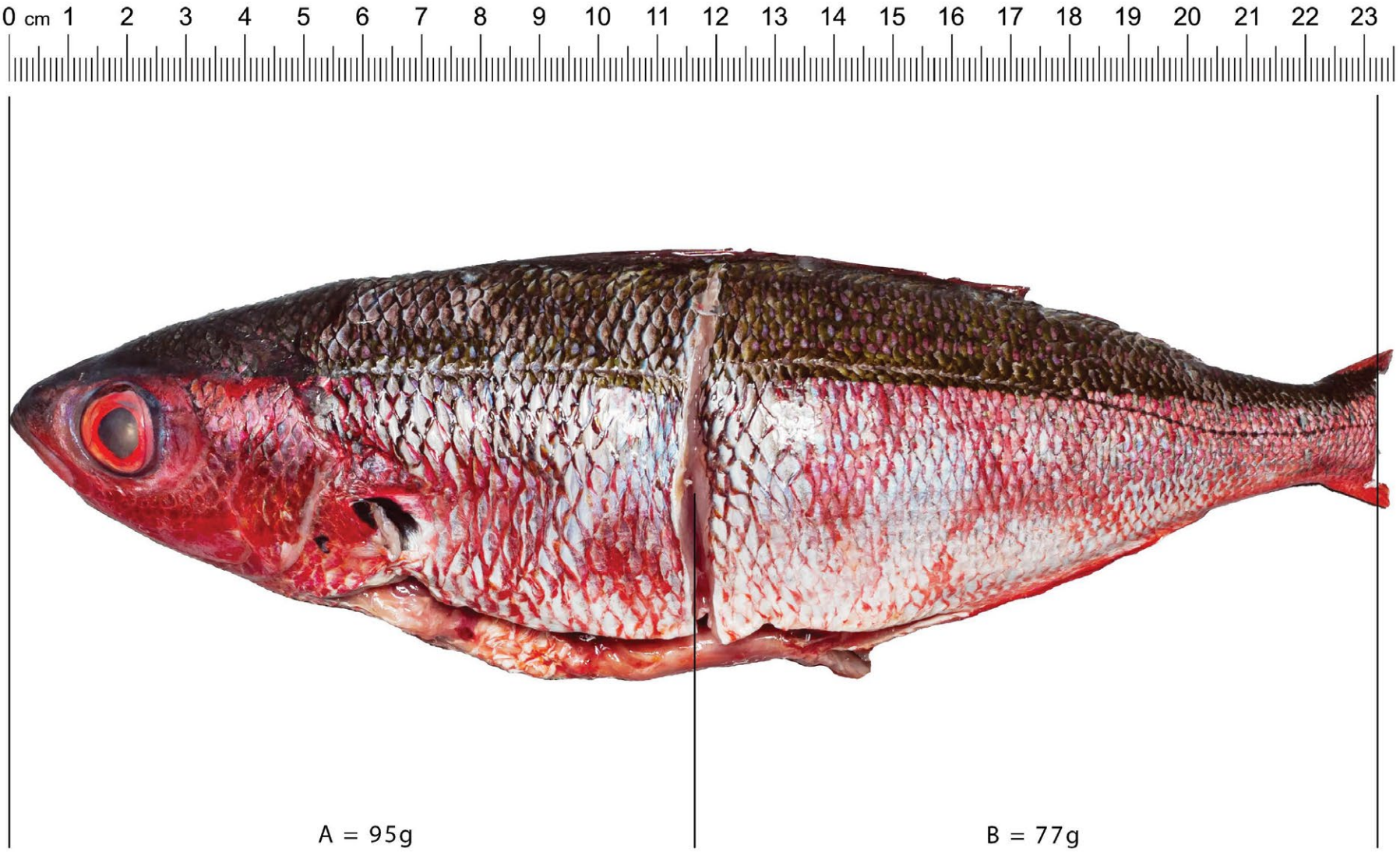
Total Weight = 556g

F7 - Tongkol - Tuna | Large

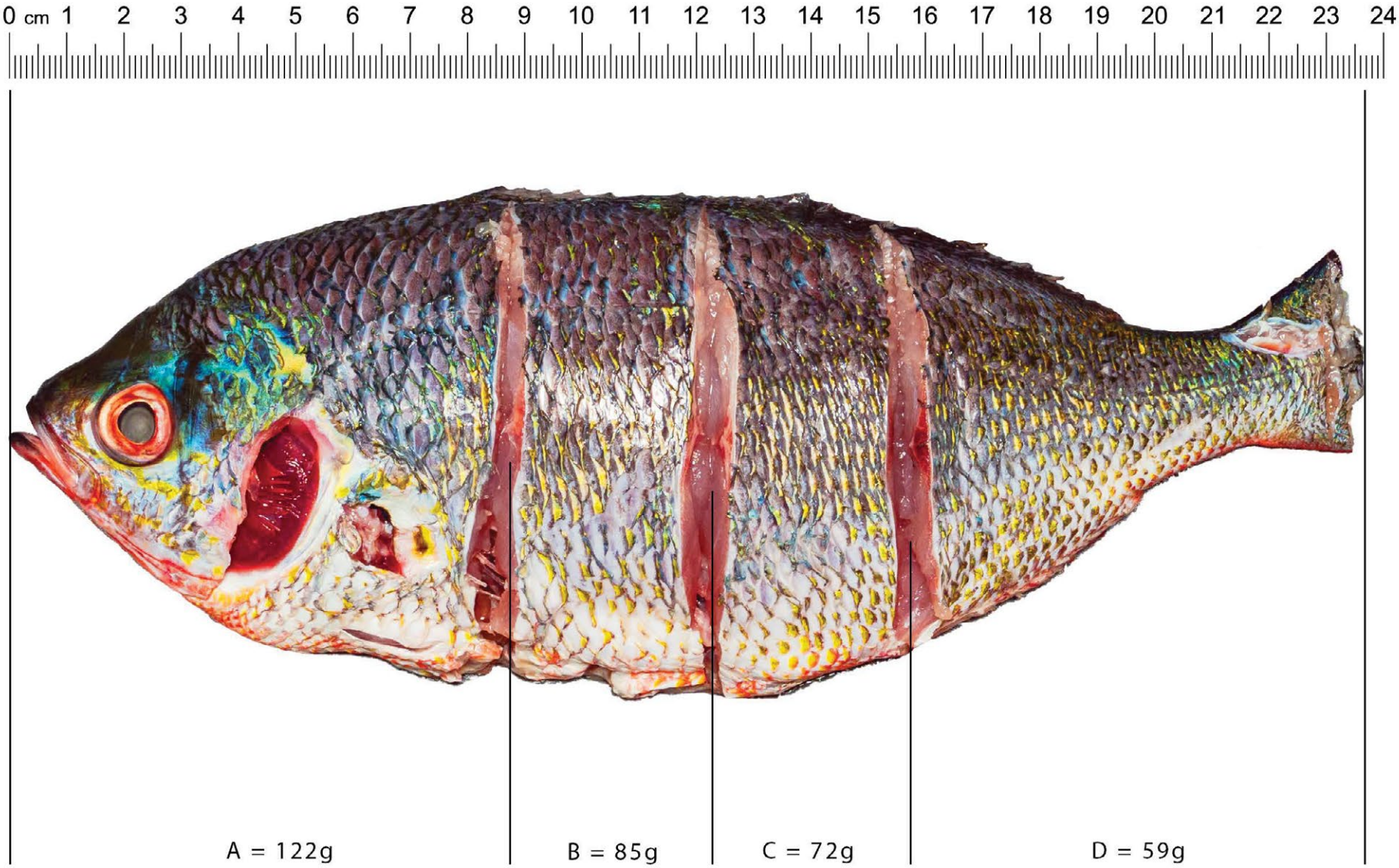
Total Weight = 1787g



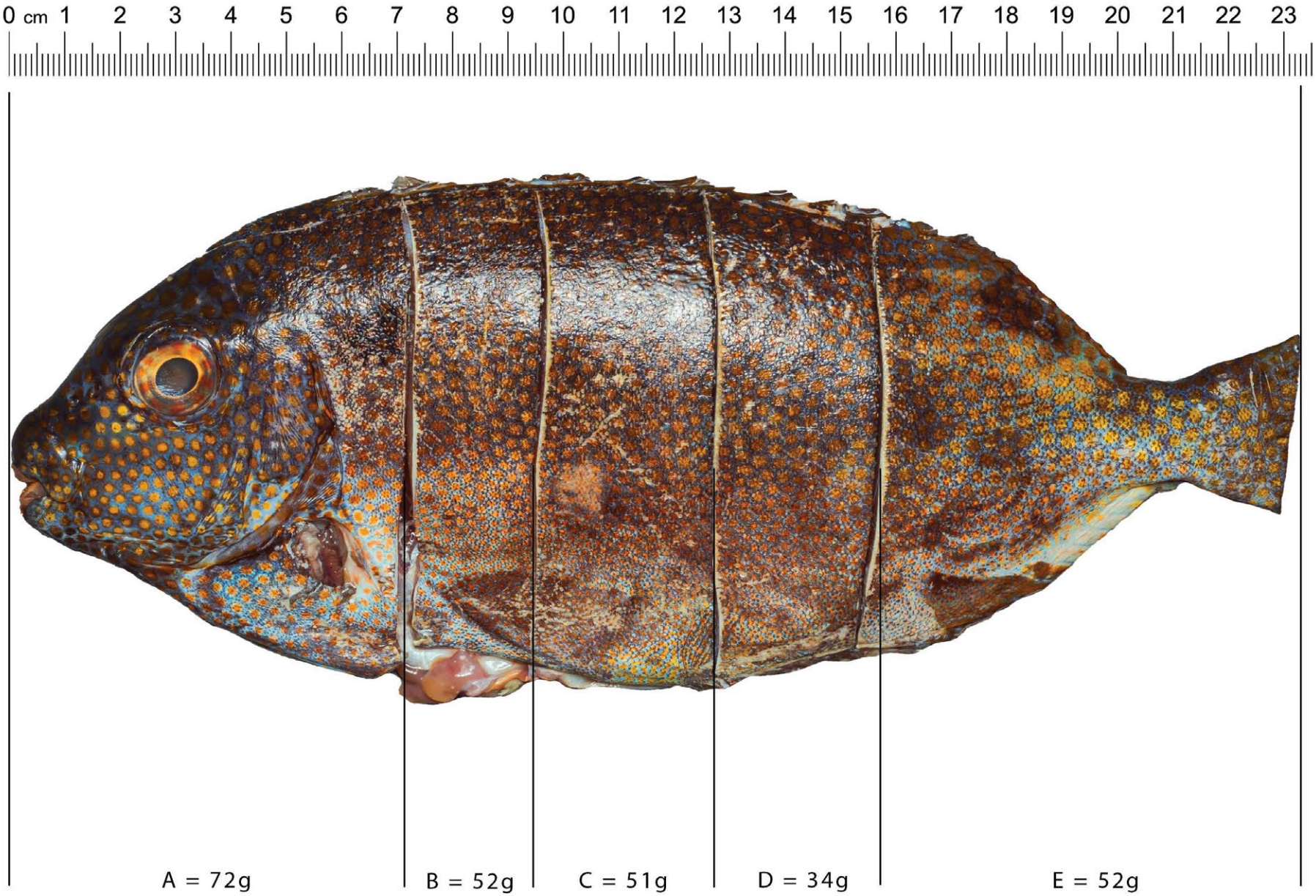
F8 - Bainar Mean - Dark Banded Fusilier | Medium| Total Weight = 187g



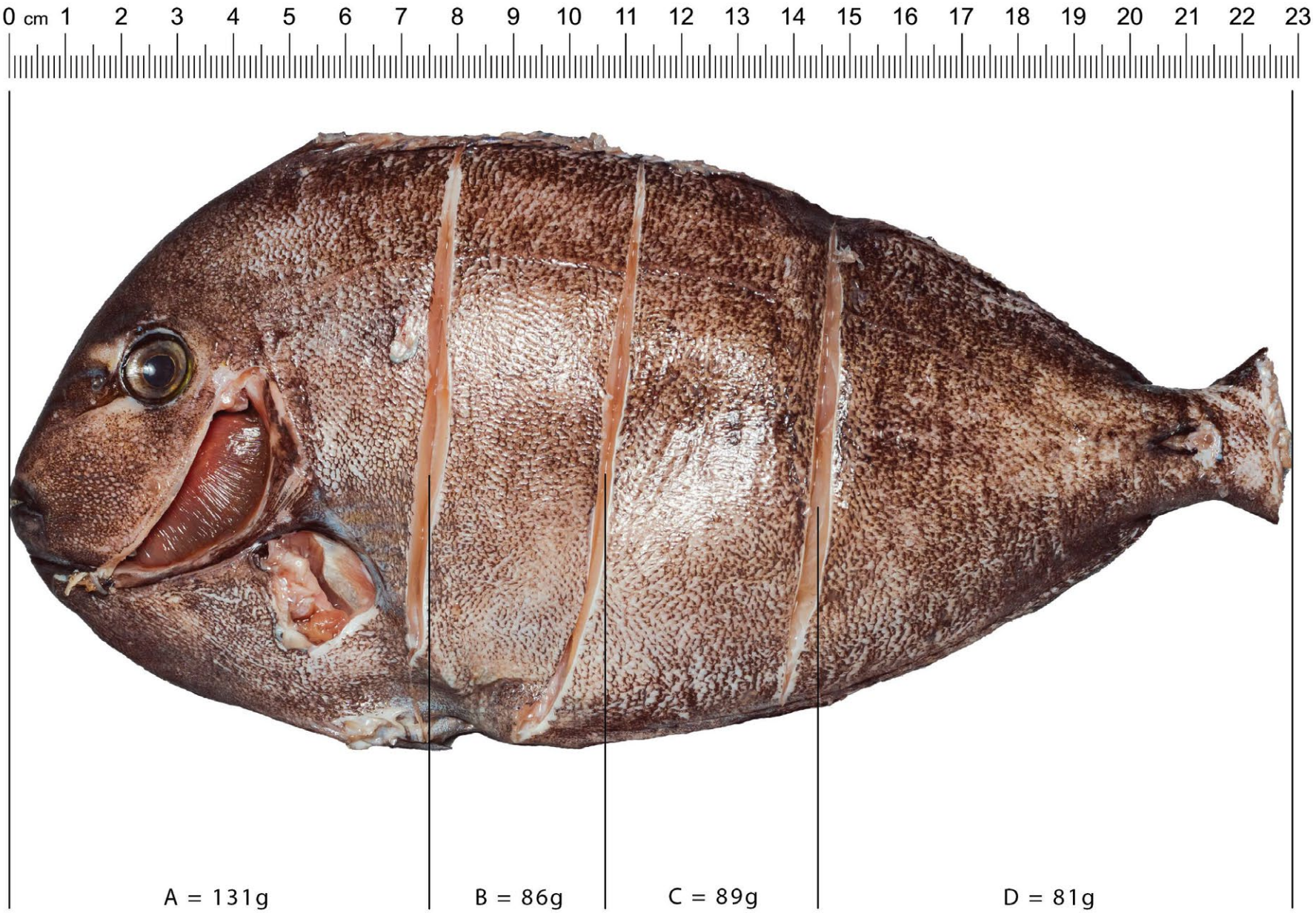
F9 - Bainar Boot - Blue Fusilier | Large | Total Weight = 369g



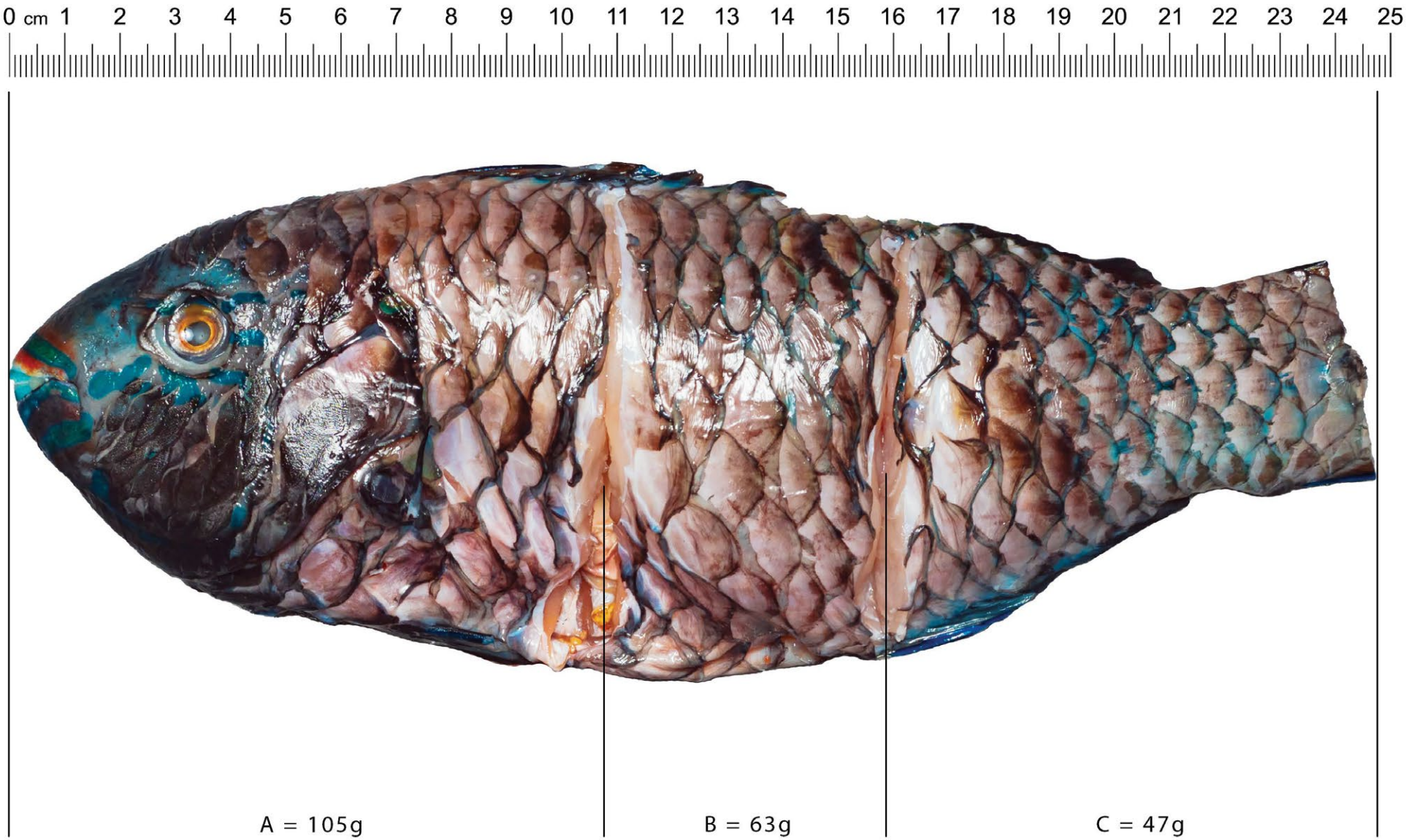
F10 - Kitan - Spinefoot | Large | Total Weight = 304g



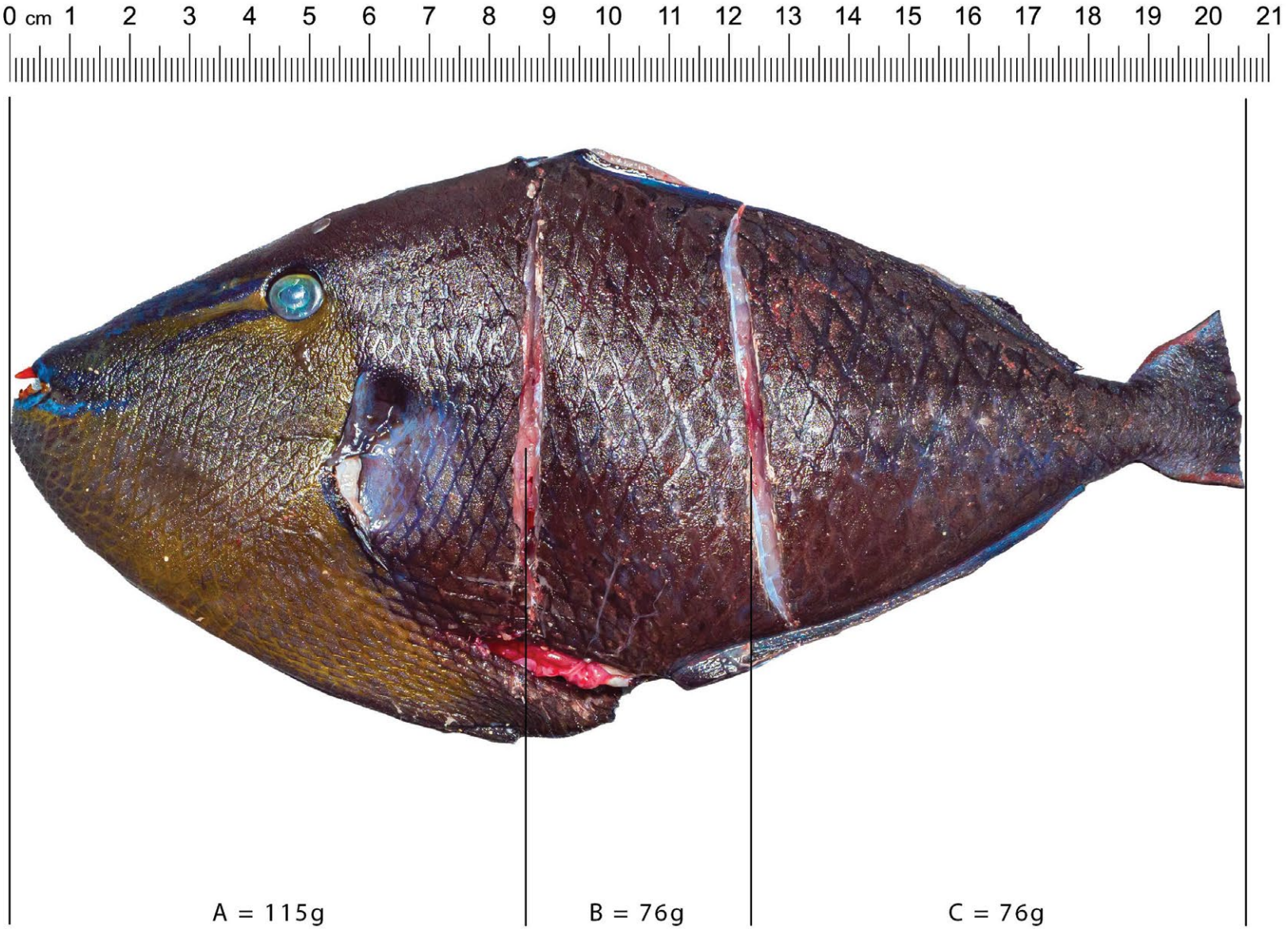
F11 - Kafir - Surgeonfish | Medium | Total Weight = 425g



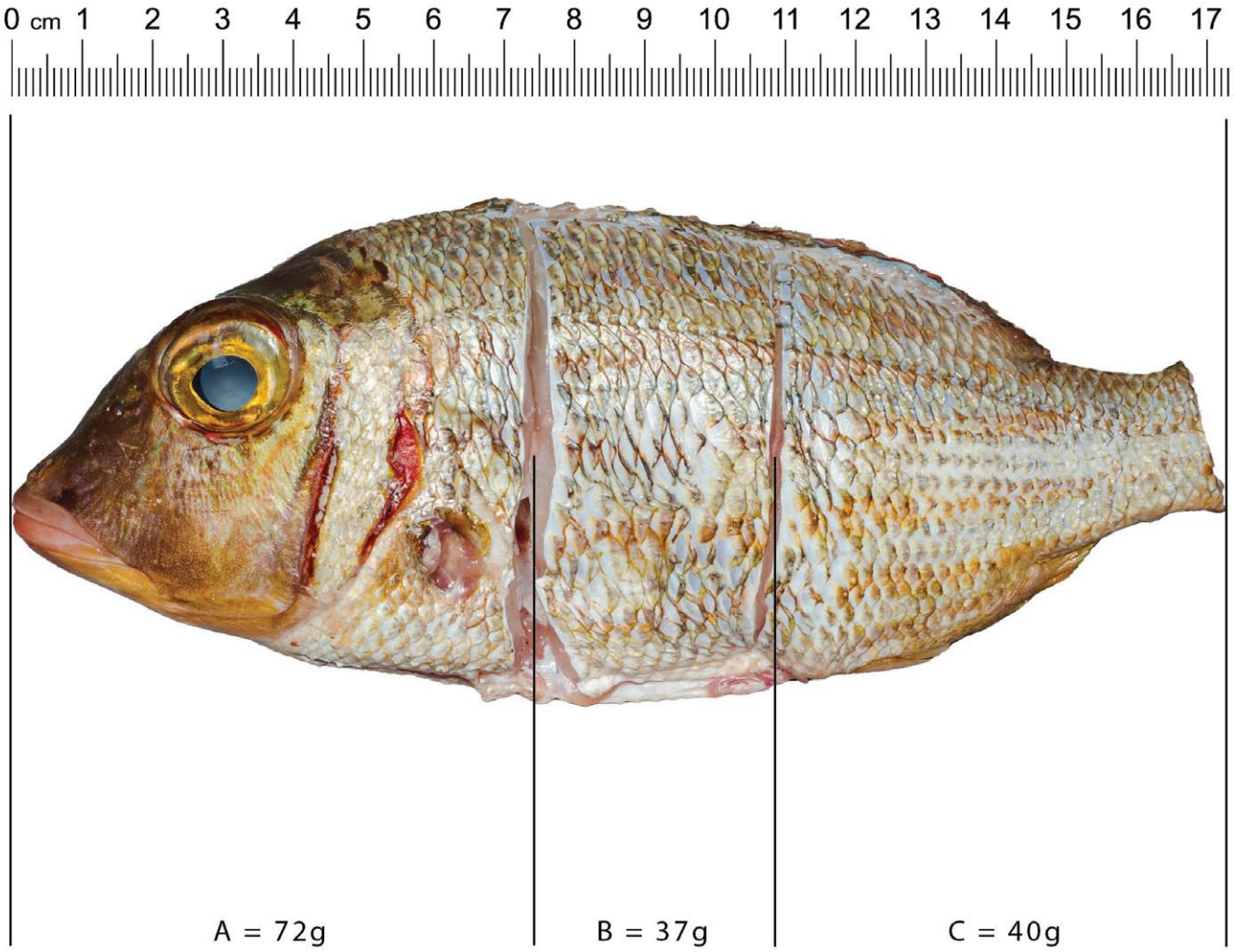
F12 - Niru - Parrotfish | Small | Total Weight = 258g



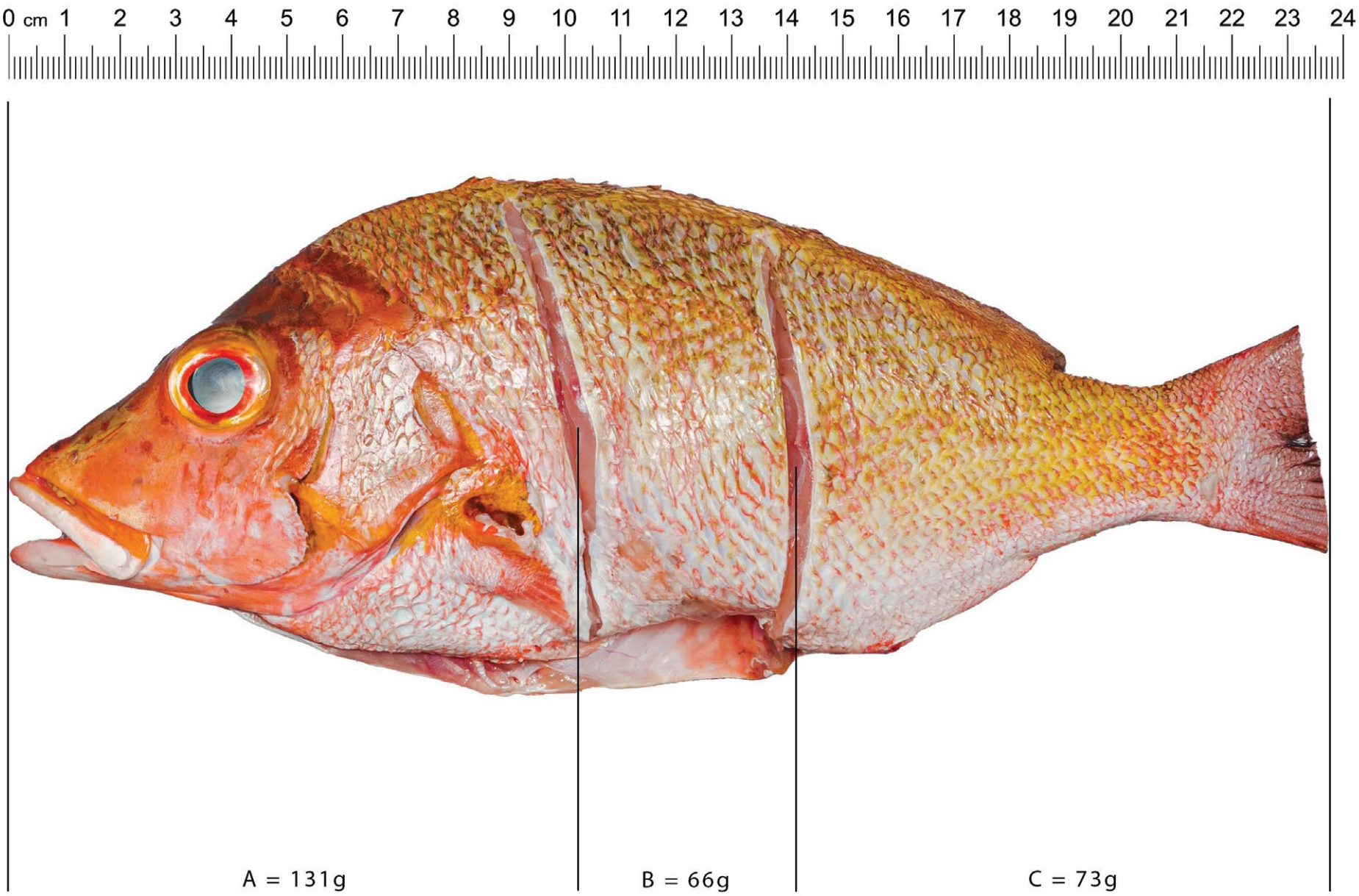
F13 - Ikan Kulit Toos - Triggerfish | Large | Total Weight = 276g



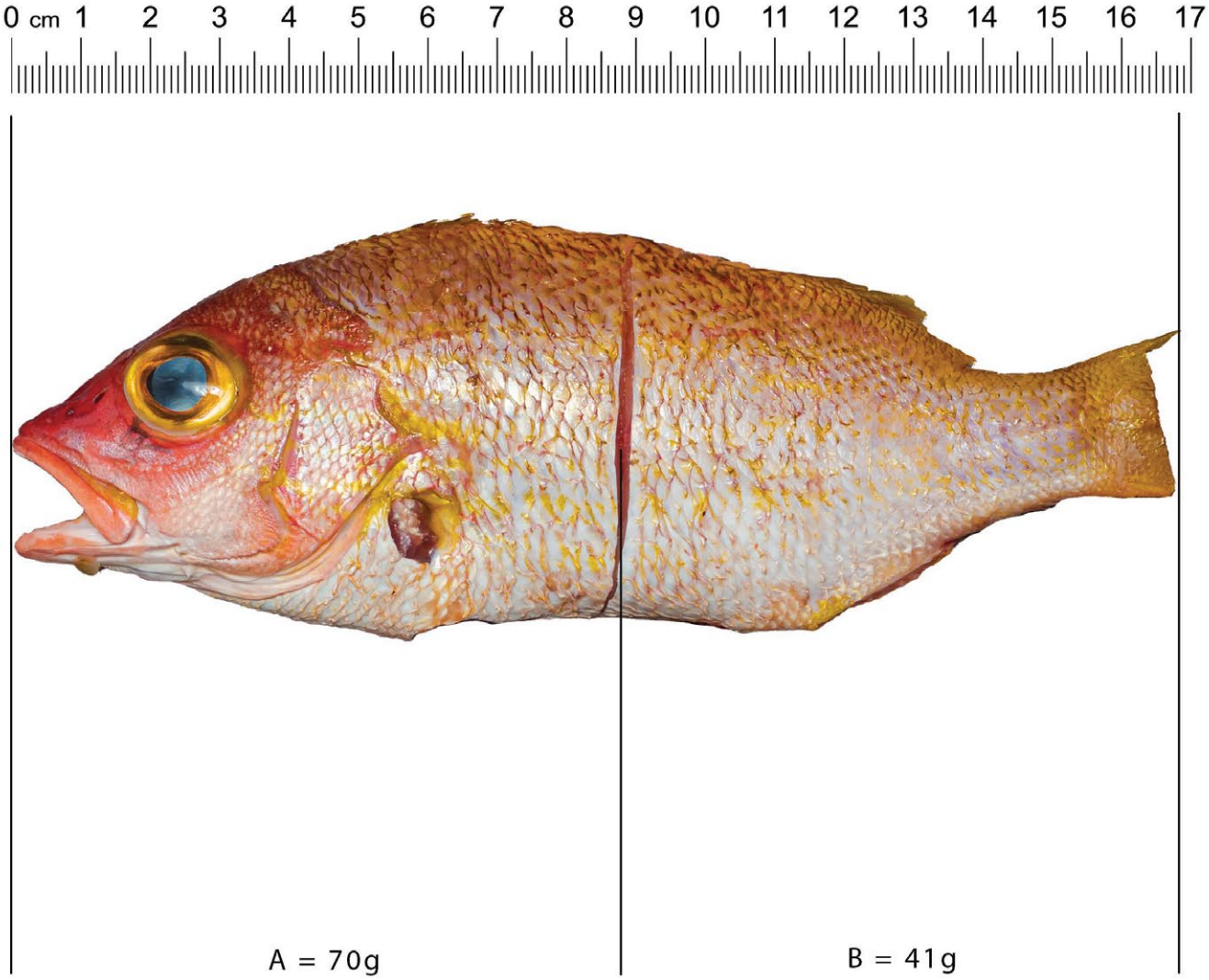
F14 - Baduma Raihenek - Ornate Emperor | Small | Total Weight = 169g



F15 - Ikan Mean - Paddletail Snapper | Medium | Total Weight = 314g



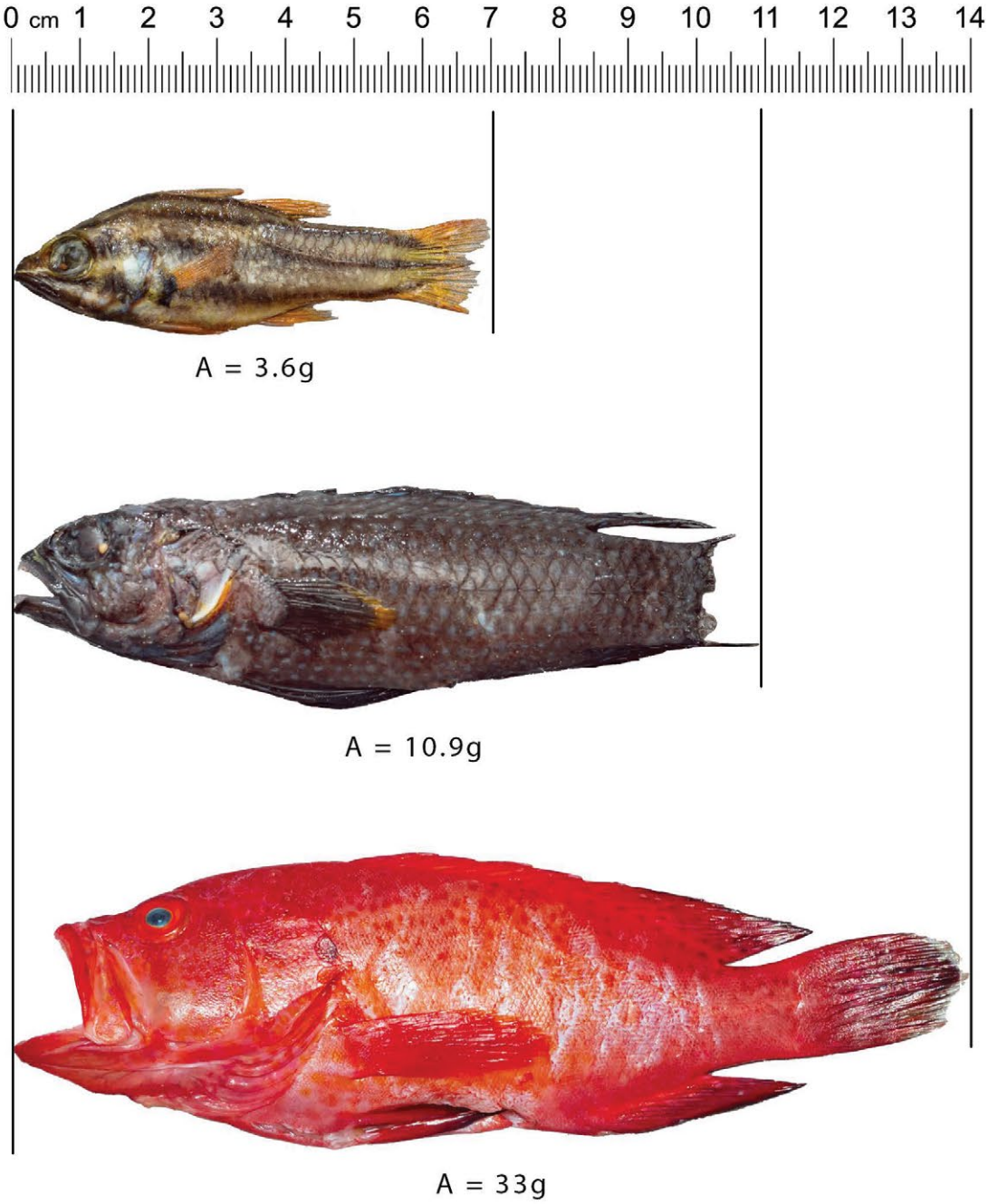
F16 - Loran Kinur - Seapearch | Medium | Total Weight = 123g



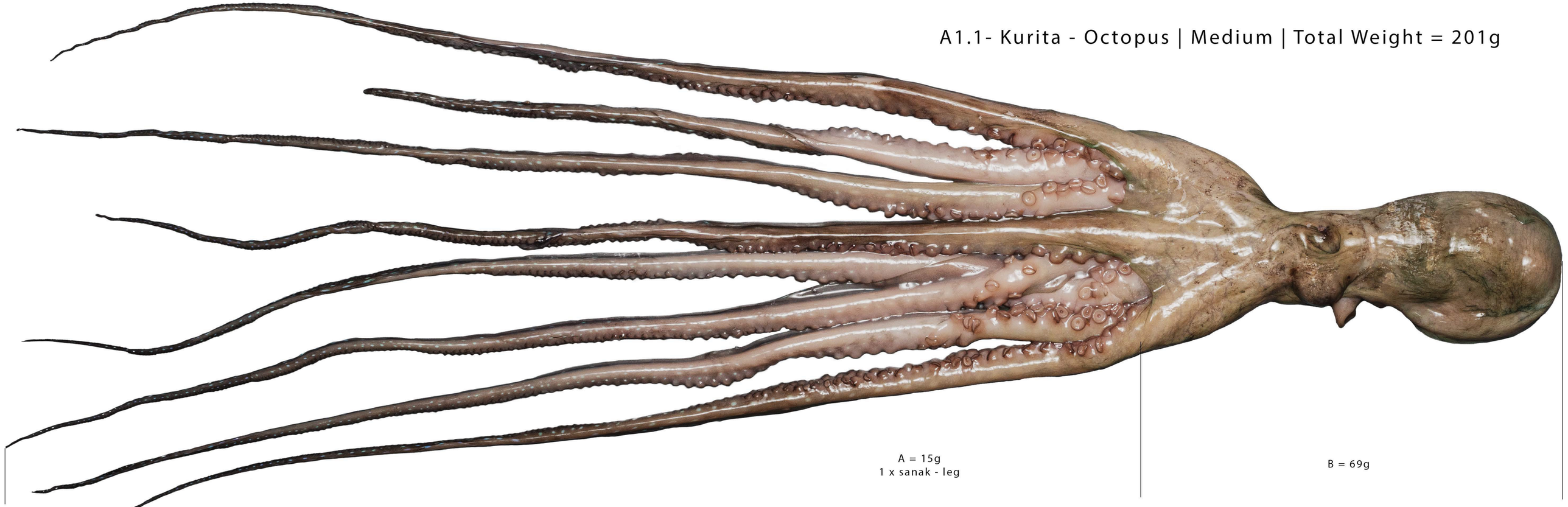
F17 - Inasivit - Hogfish

F18 - Garopa - Rockcod

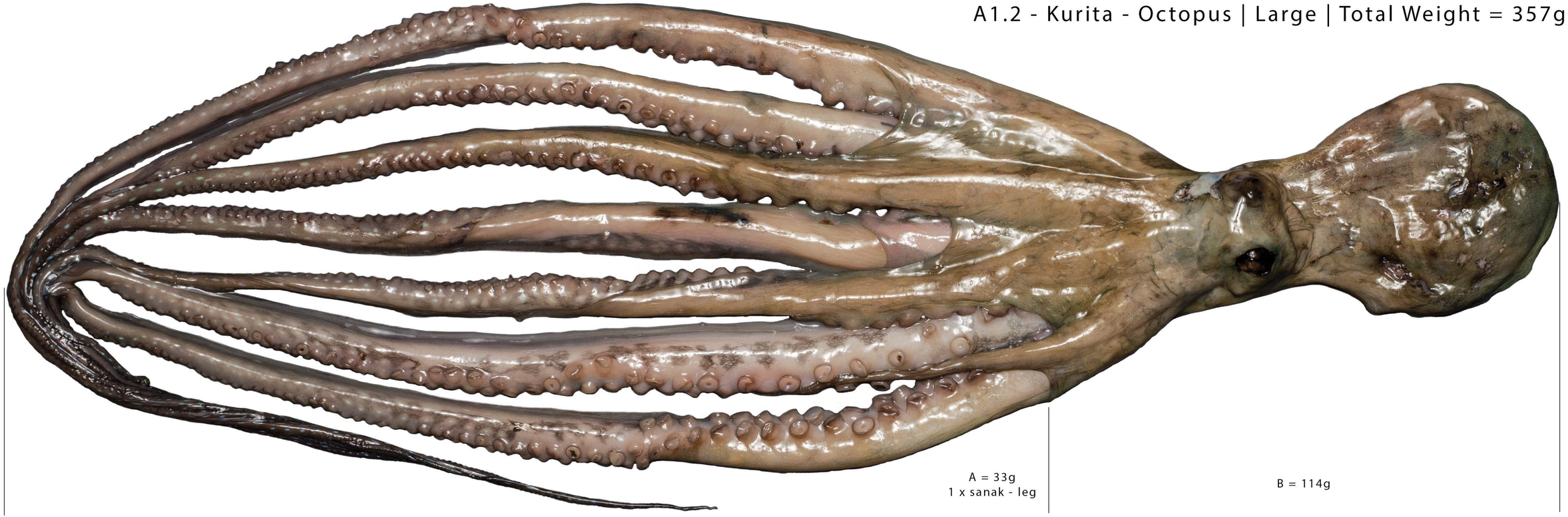
F19 - Garopa Mean - Red Rockcod



A1.1- Kurita - Octopus | Medium | Total Weight = 201g

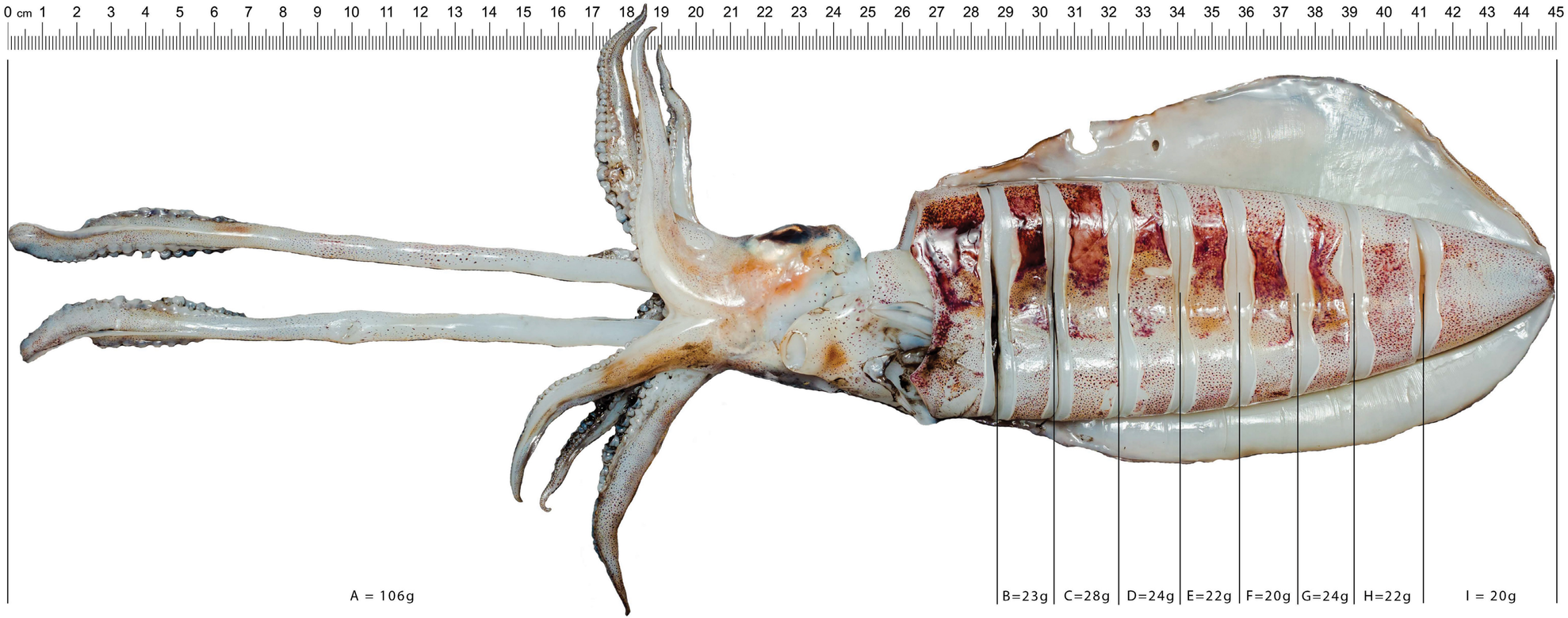


A1.2 - Kurita - Octopus | Large | Total Weight = 357g

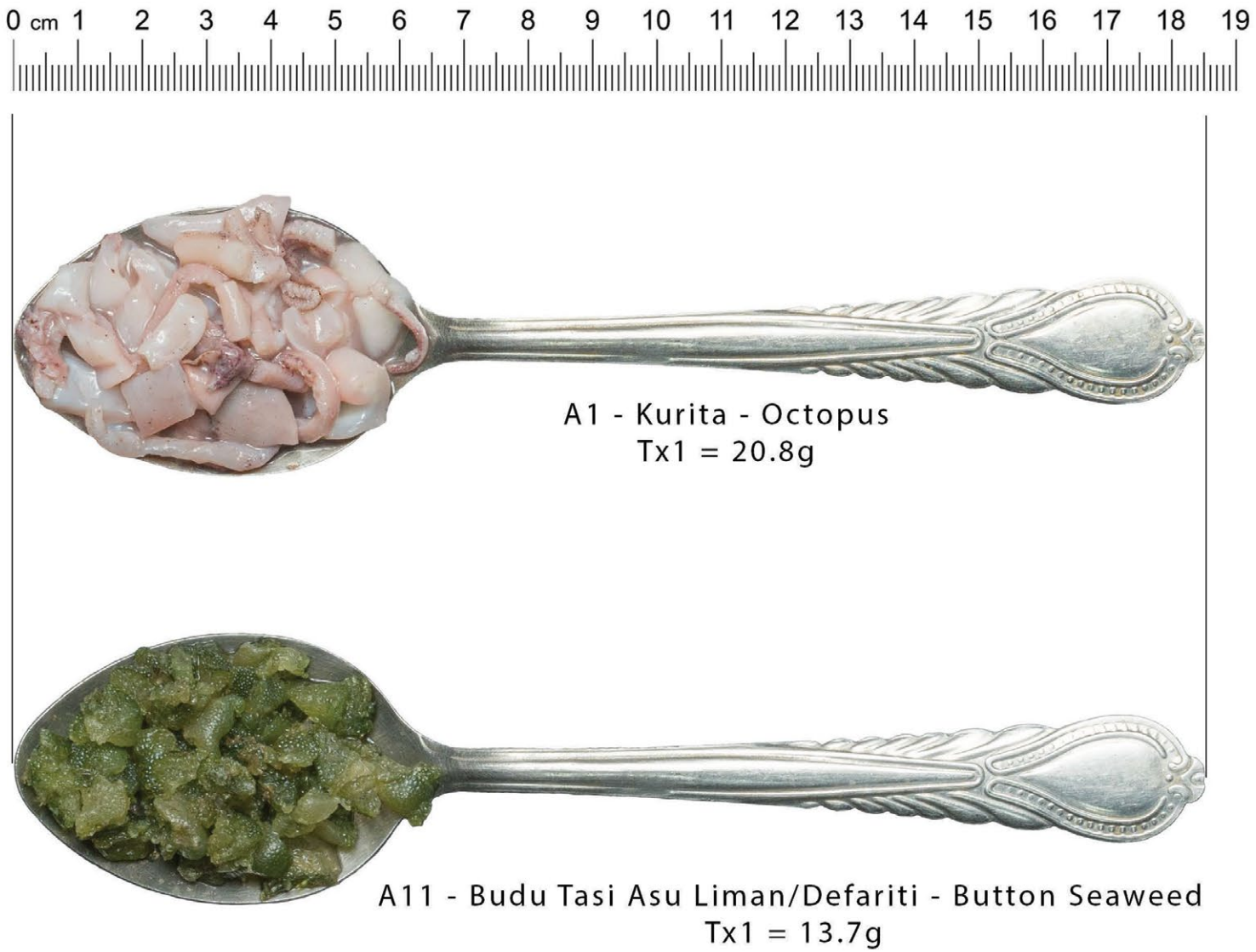


A2 - Suntu - Squid | Large

Total Weight = 324g



Ezemplu Kanuru - Example Tablespoon



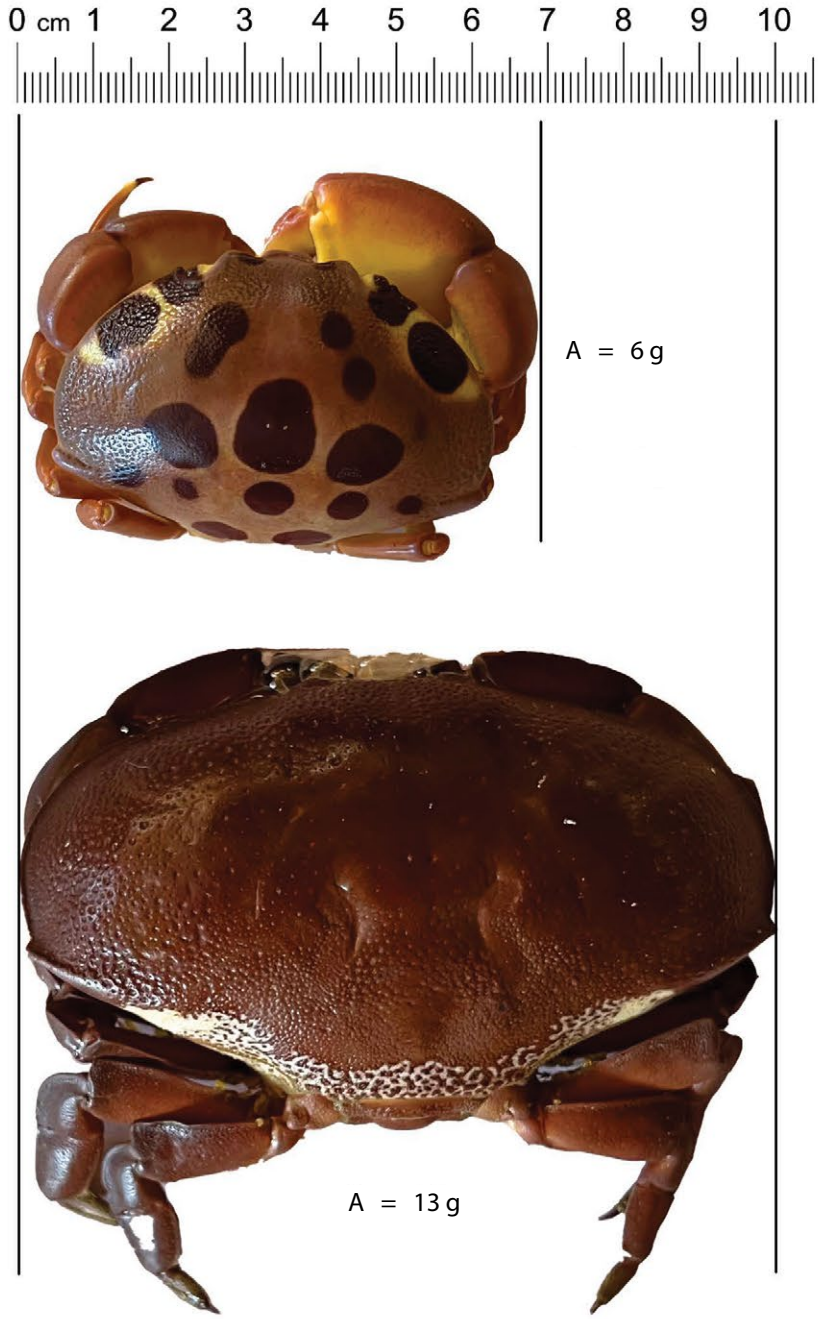
A5 - Boek Mota - River Prawn

(Todan matak - Raw weight)

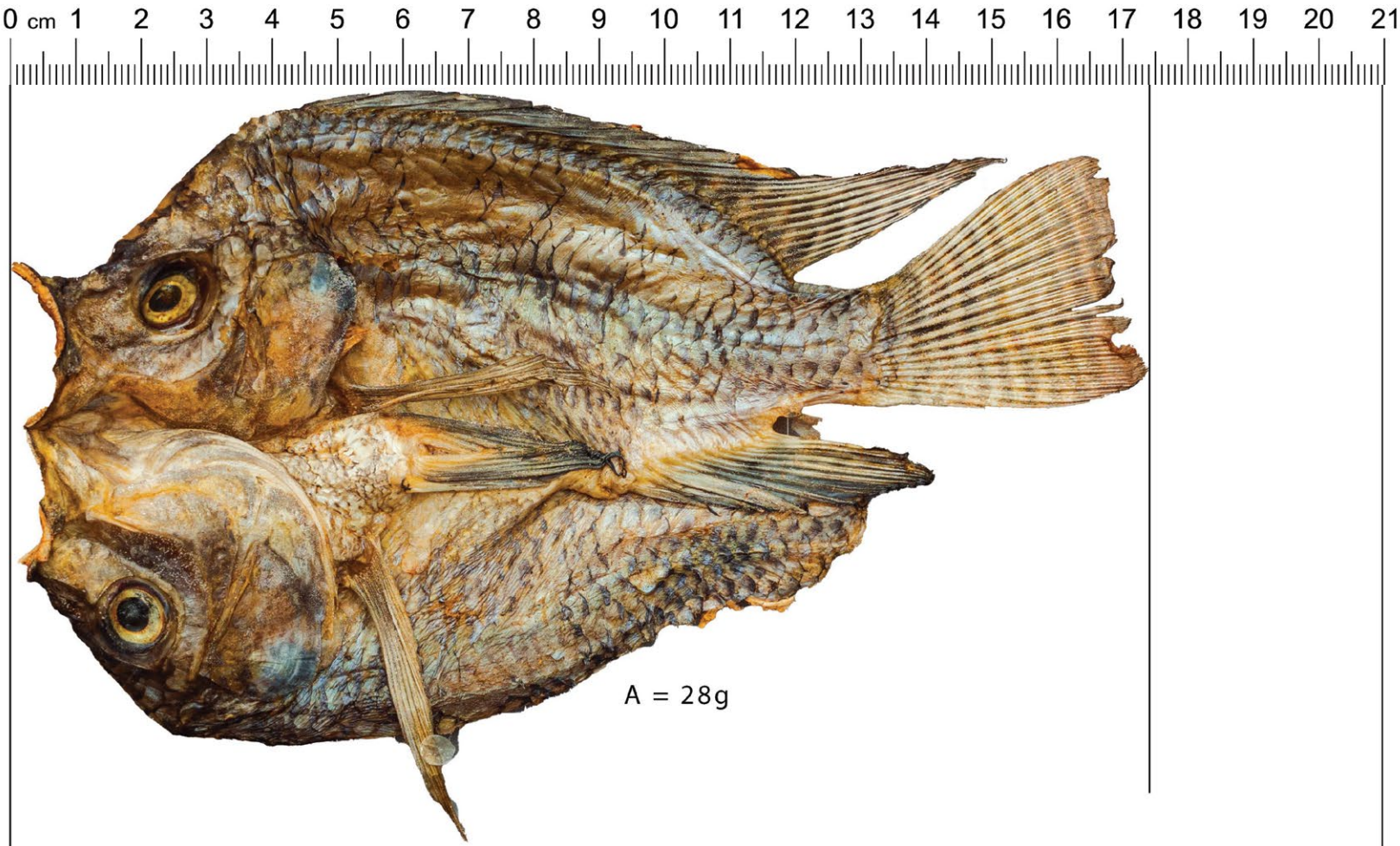
A = 20g

B = 46g

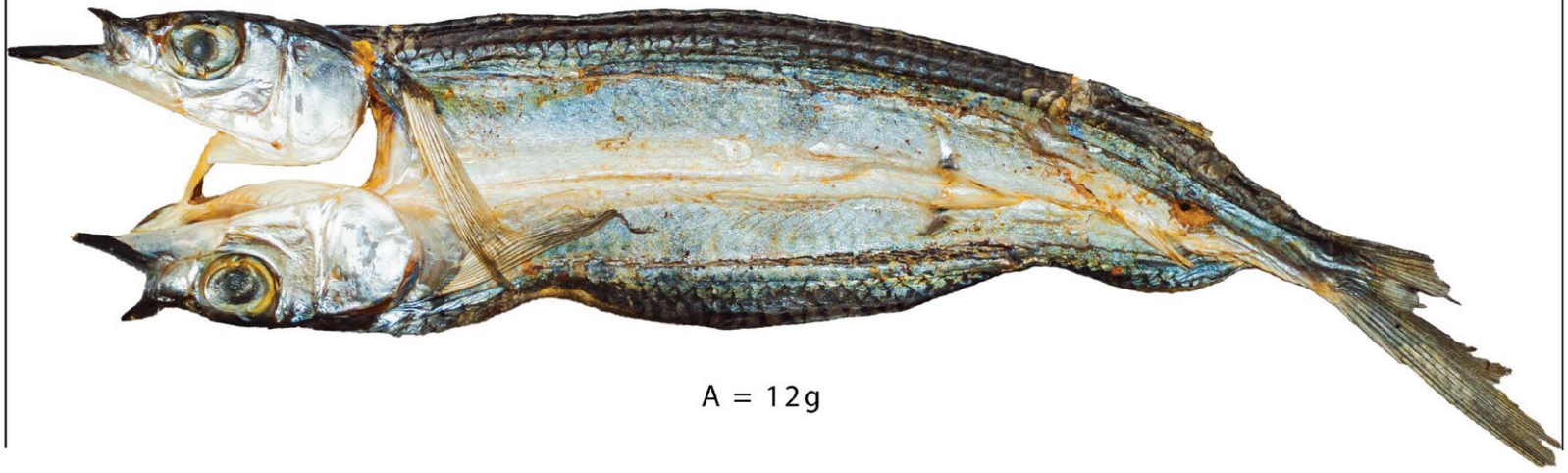
A6 - Kadiuk - Crab



P1 - Ikan Nila (maran) - Tilapia (dried)



P2 - Samber (maran) - Garfish (dried)



P3 - Ikan Tri (maran)
- Anchovies (dried)

A = 32g

P4 - Ikan isin (maran)
- Fish flesh (dried)

A = 108g

P5-Ikan Lata Globus - Tinned Tuna

A = 33 g

B = 62 g

C = 83 g

P6-Ikan Lata Sardina - Tinned Sardines

A = 21 g

B = 37 g

C = 53 g

L - Ikan Rahun Ba Labarik - Tilapia de-boned for child (raw weight)

A = 41 g

B = 72 g

C = 132 g

Appendix 3. Conversion table for portions to weights

Code	Scientific name	English	Tetum	Size	Length, whole (cm)	Weight, raw, whole (g)	Parts removed	Length, edible clean (cm)	Weight, raw, edible clean (g)	Raw edible - Portion size (g) *(as shown in portion size tool)								
									Units (Ux1)	A	B	C	D	E	F	G	H	I
F1.1	*Decapterus macarellus*	Mackerel scad	Kombong	Extra small	18	57	Viscera, scales, fins, operculum	16	54	54								
F1.2	*Decapterus macarellus*	Mackerel scad	Kombong	Small	23	124	Viscera, scales, fins, operculum	20	117	62	55							
F1.3	*Decapterus macarellus*	Mackerel scad	Kombong	Medium	27	244	Viscera, scales, fins, operculum	24	230	85	75	70						
F2	*Decapterus tabl*	Scad	Salar matan boot	Medium	27	219	Viscera, scales, fins, operculum	21	194	80	59	55						
F3.1	*Hemiramphus robustus*	Garfish	Samber	Medium	26.5	46	Viscera, scales, fins, operculum	17	42	42								
F3.2	*Hemiramphus robustus*	Garfish	Samber	Large	27	67	Viscera, scales, fins, operculum	20	57	30	27							
F4	*Cypselurus hexazona*	Flying fish	Ikan terbang/Manu	Large	27	153	Viscera, scales, fins, operculum	22	134	78	56							
F5.1	*Sardinella gibbosa*	Sardine	Sardina	Small	14.5	28	Viscera, scales, fins, operculum	13	26	26								
F5.2	*Sardinella gibbosa*	Sardine	Sardina	Large	21.2	97	Viscera, scales, fins, operculum	19	85	41	44							
F6	*Tylosurus crocodilus*	Longtom	Ikan daun	Medium	68	556	Viscera, scales, fins, operculum	52	504	81	41	58	47	56	63	49	60	49
F7	*Katsuwonus pelamis*	Tuna	Tongkol	Large	45	1787	Viscera, scales, fins, operculum	41	813	234	53.5	87	93	103	78	62.5	53	49
F8	*Peterocaesio tile*	Dark-banded fusilier	Bainar mean	Medium	24	187	Viscera, scales, fins, operculum	19	172	95	77							
F9	*Caesio lunaris*	Blue fusilier	Bainar boot	Large	29	369	Viscera, scales, fins, operculum	24	338	122	85	72	59					
F10	*Siganus punctatus*	Spinefoot	Kitan	Large	28	304	Viscera, scales, fins, operculum	23	261	72	52	51	34	52				
F11	*Acanthurus mata*	Surgeonfish	Kafir	Medium	30.5	425	Viscera, scales, fins, operculum	23	387	131	86	89	81					
F12	*Scarus ghobban*	Parrotfish	Niru	Small	24	258	Viscera, scales, fins, operculum	21	215	105	63	47						
F13	*Melichthys niger*	Triggerfish	Ikan kulit toos/Mai sunu	Large	22.5	276	Viscera, scales, fins, operculum	21	267	115	76	76						
F14	*Lethrinus ornatus*	Ornate emperor	Baduma rai-henek	Medium	22	169	Viscera, scales, fins, operculum	17	149	72	37	40						
F15	*Lutjanus gibbus*	Paddletail snapper	Ikan mean/Kamera	Medium	27	314	Viscera, scales, fins, operculum	24	270	131	66	73						
F16	*Lutjanus rufolineatus*	Seaperch	Loran kinur/Rusu karas	Medium	19	123	Viscera, scales, fins, operculum	17	111	70	41							
F17	*Ostorhinchus novemfasciatus*	Hogfish	Inasivit	Small	7	3.6	Viscera, scales, fins, operculum	7	3.6	3.6								
F18	*Epinephelus amblycephalus*	Rockcod	Garopa/Saukoto	Small	9	10.9	Viscera, scales, fins, operculum	9	10.9	10.9								
F19	*Cephalopholis sonnerati*	Red rockcod	Garopa mean	Small	14	43	Viscera, scales, fins, operculum	13	33	33								
L	*Oreochromis niloticus*	Tillapia (de-boned for child)	Ikan Nila (rahun ba labarik)	NA			All parts excluding flesh			41	72	132						
A1.1	*Callistoctopus* sp.	Octopus	Kurita	Medium	59	201	Ink sack	59	186	15	69							
A1.2	*Callistoctopus* sp.	Octopus	Kurita	Large	79	357	Ink sack	79	348	33	114							
A2	*Sepia* sp	Squid	Suntu	Large	45	324	Inner bone, ink sack, viscera	45	289	106	23	28	24	22	20	24	22	20
A5	*Macrobrachium* sp.	Prawn - river	Boek mota	Mixed		23/88	Head, shell, tail			20	46							
A6	*Carpilius maculatus*	Crab	Kadiuk	Med/Large	6.2/ 9.9	30/ 64	Shell, viscera			6 (med)	13 (lrg)							
A7	*Tripneustes gratilla*	Sea urchin	Tiri	Medium	7.5	86	All parts excluding gonads		4.5	4.5								

** Raw edible portions of fish species include bones and may require adjustment for plate waste during analysis*

Table 3. Portion size information for fresh/raw aquatic foods.

Code	Scientific name	English	Tetum	Total (g)
				Tablespoons (Tx1)
A1	*Callistoctopus* sp.	Octopus	Kurita	20.8
A2	*Sepia* sp	Squid	Suntu	20.8
A9	*Eucheuma denticulatum*	Green Seaweed	Budu tasi matak	18.0
A10	*Kappaphycus alvarezii*	Yellow Seaweed	Budu tasi kinur	18.0
A11	*Dictyosphaeria versluysii*	Button Seaweed	Budu tasi asu liman/defariti	13.7
				Units (Ux1)
S1	*Asaphis violascens*	Clam	Siput	2.9
S9	*Conomurex luhuanus*	Sea snail	Siput	2.3
S10	*Conus capitaneus*	Sea snail	Siput	9.0
S14	*Lambis lambis*	Sea snail	Siput	16.5
S16	*Tectus niloticus*	Sea snail	Siput	19.5
S18	*Turbo setosus*	Sea snail	Siput	2.7
S19	*Tectus pyramis*	Sea snail	Siput	0.7

Table 4. Portion size information for fresh/raw aquatic foods consumed in tablespoons or units.

Code	English	Tetum	Total (g)	Portion (g)			Total (g)
			Units (Ux1)	A	B	C	Tablespoons (Tx1)
P1	Tilapia (dried)	Ikan Nila (maran)	28	28			
P2	Garfish (dried)	Ikan Samber (maran)	12	12			
P3	Anchovies (dried)	Ikan tri (maran)	32	32			
P4	Part-dried flesh	Ikan isin (maran)	108	108			
P5	Tinned tuna (Globus)*	Ikan lata (Globus)*	178	33	62	83	
P6	Tinned sardines*	Ikan lata Sardina*	111	21	37	53	
P5	Tinned tuna (Globus)	Ikan lata (Globus)					17.7
P6	Tinned sardines	Ikan lata Sardina					17.7

** Drained weight*

Table 5. Portion size information for processed aquatic foods.

About WorldFish

WorldFish is a leading international research organization working to transform aquatic food systems to reduce hunger, malnutrition and poverty. It collaborates with international, regional and national partners to co-develop and deliver scientific innovations, evidence for policy, and knowledge to enable equitable and inclusive impact for millions who depend on fish for their livelihoods. As a member of CGIAR, WorldFish contributes to building a food- and nutrition-secure future and restoring natural resources. Headquartered in Penang, Malaysia, with country offices across Africa, Asia and the Pacific, WorldFish strives to create resilient and inclusive food systems for shared prosperity.

For more information, please visit www.worldfishcenter.org