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Seafood in Uruguay: knowledge, attitudes and practices of professional chefs in a country with its back to the sea

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Abstract

Despite having valuable fisheries resources, including diversity, Uruguay shows a deficient level of seafood consumption, although it is highly recommended for the human diet. However, many of the country's fishery resources may be exploited unsustainably. The recent increase in gastronomic activity makes professional chefs key actors who could influence the consumption of seafood products sustainably. In this context, this paper aimed to analyze the knowledge, attitudes and practices (KAP) of a focus group in the gastronomic sector, assessing their potential as promoters of changes in eating habits towards seafood products. Results showed that the knowledge of seafood products was generally very low. The topics that showed the best responses were those related to management, such as institutions and tools. The least known aspects refer to fishing seasons ("Zafras") and the origin of the products (wild or aquaculture). Respondents showed a positive attitude toward the need to encourage seafood consumption in the country following sustainability criteria. Seafood products were well represented on specialized restaurant menus. Certain practices are recurrent to highlight these products in the offer, such as suggesting "catch of the day" or varying species according to availability. Regarding the purchase of seafood products, practices show the importance of seasonal supply, their sustainability and the personal preferences of the chefs. The importance of direct purchases from small-scale fishermen stands out. It is concluded that acquiring greater knowledge by professionals could improve the food practices they develop.

1. Introduction

The gastronomy of Uruguay is made up of a mixture of cultural influences. However, its most notable feature is the high use of beef, a reflection of the country's historic livestock production, a process born in the countryside and later consolidated in its capital, Montevideo (Laborde, 2017). The country presents a low per capita level of seafood (i.e., derived from aquatic animals, plants or algae that are caught or cultivated) consumption (nearly 10 kg fish per inhabitant per year) (Mazza Pérez, 2007; INE, 2008; FAO, 2020). For example, fish reaches 45% of Uruguayan households, being surpassed by beef (98%), chicken (83%) and pork (51%) (INAC, 2019). Despite that, international recommendations mention the importance of eating fish once or twice a week or 40 g per day, in Uruguay, the consumption of fish barely reaches 54 g per person per week, which constitutes 1/3 of the recommended portion (INE, 2008; Mozaffarian and Wu, 2011; Sala-Vila *et al.*, 2016; Rimm *et al.*, 2018). In addition, increased consumption of seafood would improve nutrition with less environmental burden, in line with the Sustainable Development Goals (UN, 2015) to improve nutrition (Goal 2), ensure consumption and production (Goal 12) while attending to the sustainable use of marine resources (Goal 14) (Gephart *et al.*, 2021).

Over 100 species are landed in the Uruguayan coastal zone, including bony and cartilaginous fish, shellfish (crustaceans and molluscs) and algae (DINARA, 2019). Most show seasonal and spatial variations (Vögler *et al.*, 2020). The catch is made by three fishing fleets: small-scale, coastal and high-seas industrial. Currently, internal consumption is 35% of the offer, and many products are not commercialized in the

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domestic market (MGAP, 2015; Etchebere *et al.*, 2018). Focusing on production and consumption patterns can strengthen the ability to implement effective fisheries management (Khalilian *et al.*, 2010). The birth of a global movement favouring the rational use of seafood is evident in shifting consumer demand toward more sustainable products (de Vos and Bush, 2011; Mitchell, 2011). In this context, restaurants (as well as retailers) are vital players (among others) in educating about the need to improve fish consumption on the way to a balanced diet for health maintenance. Uruguayan gastronomy has grown constantly over the last 20 years, presenting 3719 gastronomic establishments and providing valuable employment (20.166 persons) (INE, 2020). The latter could be explained by the increase in frequency in which Uruguayans go out to eat or order food by delivery (especially since the SARS-CoV-2 crisis), the significant development of tourist activity and the graduation of professional Chefs. While there has been much research on consumer attitudes towards food choices, there is little data on chefs' attitudes towards that choice (Corney *et al.*, 1998). Since they are directly involved in the preparation and provision of food, Chefs can play an essential role in influencing changes in food practices toward healthier and more sustainable products. Currently, gastronomy is considered a symbol of culture and restaurants as privileged places for the production and exchange of culture (Mejía-López *et al.*, 2014; Fusté -Forné, 2016). Thus, Chefs, as representatives of the local gastronomic culture (Lasater-Wille, 2018), can be seen as influencing agents of food choices, how people view food and the act of eating. Understanding the food selection process should be necessary to develop strategies to modify eating habits.

In this context, this work aimed to analyze the knowledge, attitudes and practices of a focal group of professional chefs in the Uruguayan gastronomic sector. Furthermore, it pursues to infer relationships between gastronomy, human health and the sustainable use of marine biological species. The research strategy follows the KAP approach (knowledge, attitudes and practices), which allows for collecting information regarding what is known about a particular topic (knowledge), what is believed, felt and expected (attitudes) and what is done concerning that topic (practices). KAP is generally applied by elaborating a survey generated based on standardized parameters (Lessa *et al.*, 2017; Asmahan *et al.,* 2021; Srivastav *et al*., 2022).

2. Materials and methods

2.1 Sample selection

The study focused on a subset of chefs from gastronomic ventures in the Atlantic coastal zone of Uruguay. These professionals were identified based on the web database https://www.saliracomer.com and those related to the Uruguayan Gastronomic Association (AUG). Of these, businesses mainly focused on seafood, local products or signature cuisine were invited to participate in the survey. Furthermore, fast food and mass-affluence establishments were excluded. From there, the total population of restaurants suitable for the study, i.e., those self-identified as serving fish and seafood, was determined to be 187. These were initially consulted about their willingness to participate in the study. Once all responses were obtained, Raosoft sample size calculator (http://www.raosoft.com/samplesize.html) was used to determine the margin of error and confidence level obtained by the survey.

2.2 Knowledge, attitudes and practices approach

A survey was designed according to this approach (Hausmann-Muela, 2003; WHO, 2008). It is based on determining the cooks' knowledge of the country's seafood, its biological, fishing and geographical aspects; evaluating the degree of willingness of cooks (attitudes) to promote the use of seafood and identifying the procedures (seafood offered on the menu, species used) that chefs carry out at present. The survey consisted of 5 sections, summing up 64 questions to be answered in 15-30 mins. Table 1 summarizes the survey structure, and the complete questions can be obtained from the author on request.

2.3 Data analysis

The assessment of knowledge covered different aspects where an index for the following knowledge categories was estimated: species, harvesting, origin of fish, origin of shellfish (crustaceans and molluscs) and algae, management of fishery resources and consumption habits in the country. Each category consists of different questions, assigned the value of 1 if the answer is correct and 0 if incorrect. The total points for each type are put into perspective on a scale of 100%, where the latter means that all the questions in that category were answered correctly. Attitudes were evaluated through rating questions, where a premise is set, and the respondent must rate their answer on a scale of 1 to 10. Higher values represent positive attitudes towards the use of seafood. To evaluate practices in seafood supply on menus, we used the proportions of dishes based on seafood concerning the total number of dishes (starters and main dishes separately). "Day caught local fish" and "product information" were evaluated using yes/no questions. To assess the diversity of species used (seafood, algae, and fish), the respondents should choose the species they usually cook (12 options, including others). The number of choices for each species was

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Table 1. Structure of the KAP survey regarding seafood applied to Uruguayan chefs.

Section	Aspects surveyed	N°: type of questions
Personal information	Age, sex, Nationality, Professional Training, Professional experience	7: Numerical
Entrepreneurship data	Location, seniority, number of employees, number of tables, prices	5: Numerical, Multiple choice
Knowledge	Main species, main fishing seasons, origin of the species, regulations, benefits for health, consumption in the country	30: Numerical Multiple choice Yes/no
Attitudes	Importance of seafood, assessment as a typical dish, gastronomic difficulty, perception of the diners, of the importance of sustainability	6: Scale valuation 1 to 10
Practices	Proportion of seafood in the menu, offering of product information, catch of the day, main species used, replacement of species in the menu, criteria for the purchase of products, main product suppliers	11: Numerical Multiple choice Yes/no

counted as a measure of preference for that species. The same approach was used to assess seasonal preferences (menu changes), purchase criteria (availability, price), and preferences for different suppliers (small-scale, industrial). The information was analyzed in a general way and considered the following main factors: personal (gender, professional training, experience), business (age, size, prices). Kruskal-Wallis analysis was used to detect significant differences between the factors considered. Therefore, results are only reported for those cases where significant differences ($\alpha < 0.05$) or evident patterns existed.

3. Results

A maximum of sixty-five people answered the survey, although not everyone answered all the questions. For instance, fewer people (only owners or managers) answered the sections referring to the business's characteristics. Considering a population of 187 restaurants, the survey was completed by 35% of the total. This corresponds to a margin of error of 10% and a confidence level of 95%. The average age was 40, half male and half female, with secondary or tertiary education and five years of average experience (Table 2).

Table 2. Descriptive statistics of the cases studied in the KAP study regarding seafood applied to Uruguayan chefs.

	N	Mean	Minimum	Maximum
Staff				
Age	62	37.34	18.00	63.00
Training	65	2.78	2.00	4.00
Professional experience (years)	63	4.83	0.00	30.00
Business				
Seniority (years)	65	4.72	0.00	15.00
Employees	36	10.44	1.00	40.00
Seats	30	59.97	3.00	200.00
Prices	32	3.25	2.00	4.00

3.1 Knowledge

Knowledge of Uruguayan seafood products could be higher, exceeding 50% of the correct answers in a few cases. The best-known issues are resource management, its tools and the institutions in charge. The least known aspects refer to the fishing seasons and the origin of the products (small-scale, industrial or aquaculture) (Table 3).

In more detail, only 13% knew about the four main species fished in Uruguay, and only 2% of respondents correctly answered which were the main shellfish caught in the country (Figure 1).

Table 3. General knowledge of chefs regarding seafood products in Uruguay.

Aspects of knowledge	N	%	SD
Country's fish species	36	54	19
Seasonality	15	22	25
Origin of fish	31	46	27
Origin shellfish	20	29	19
Fisheries management	38	56	22
Fish consumption	28	42	27

N: Number of responses, %: correct answers obtained from respondents, SD: standard deviation.

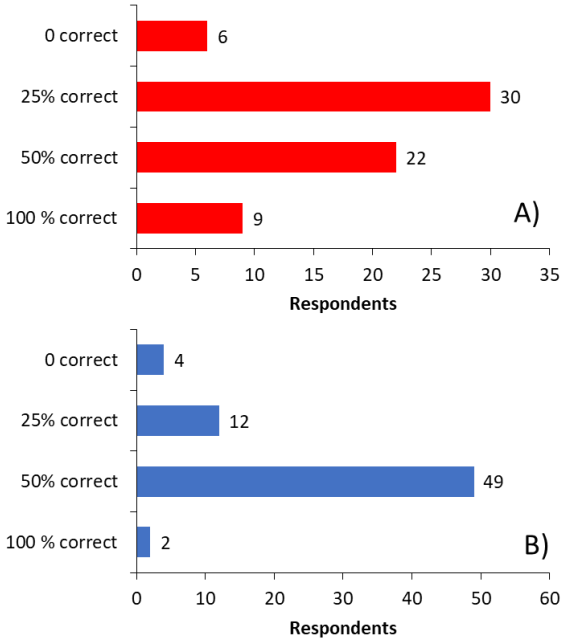

Figure 1. Level of knowledge (% of people responding correct answers) of the main species fished in the country by chefs in Uruguay; A) fish and B) shellfish and algae.

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Regarding the origin (wild, aquaculture, small-scale or industrial), about 60% were correct in the case of silverside and Brazilian codling; however, almost 40% still needed to learn the origin of croaker or salmon (ubiquitous products in the offer). Concerning the source of shellfish, in general, the knowledge is less than 60%, reaching less than 20% for squid and less than 10% for scallops (Figure 2). The degree of knowledge about fisheries management in the country (Table 4) was on average intermediate, but very uneven in terms of the aspects. For example, 70% are aware of the existence of closed seasons, but only 4% are mindful of permitted sizes for fish. It should be noted that 65% are aware of over-exploited fish stocks.

Regarding the analysis of knowledge segregated by the different factors (sex, professional training, location, experience, seniority, size, prices), no differences were observed in many cases. However, considering the degree of knowledge according to the level of education, a higher percentage of correct responses is evident with higher instruction, being substantially higher in the case of tertiary education (Figure 3). In this sense, knowledge of the species in the country, their seasonality and fisheries management were much higher in those with tertiary education, although there are no significant differences between primary and secondary education.

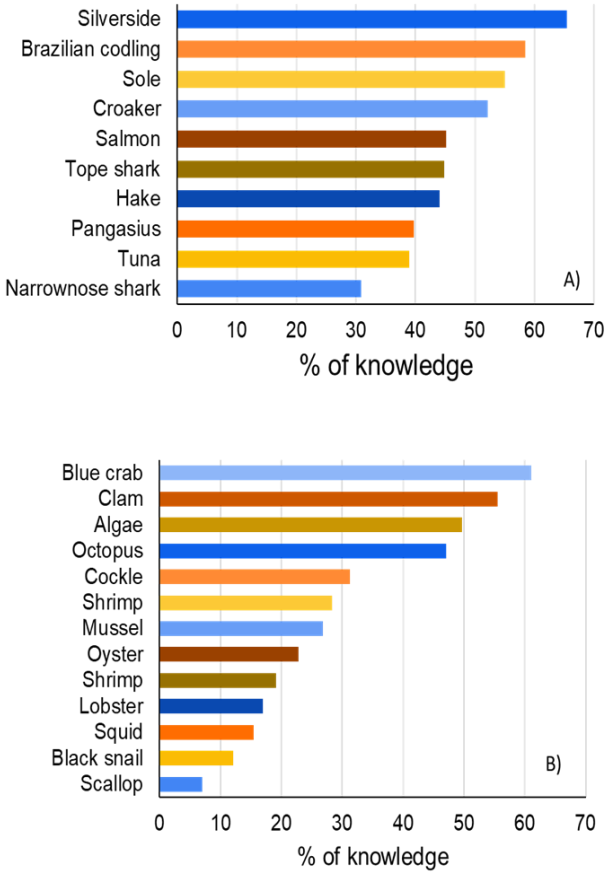

Figure 2. Percentage of knowledge about the origin of the species offered in the Uruguayan market (100% represents that all the respondents answered correctly about the origin of the product); A) fish and B) shellfish and algae.

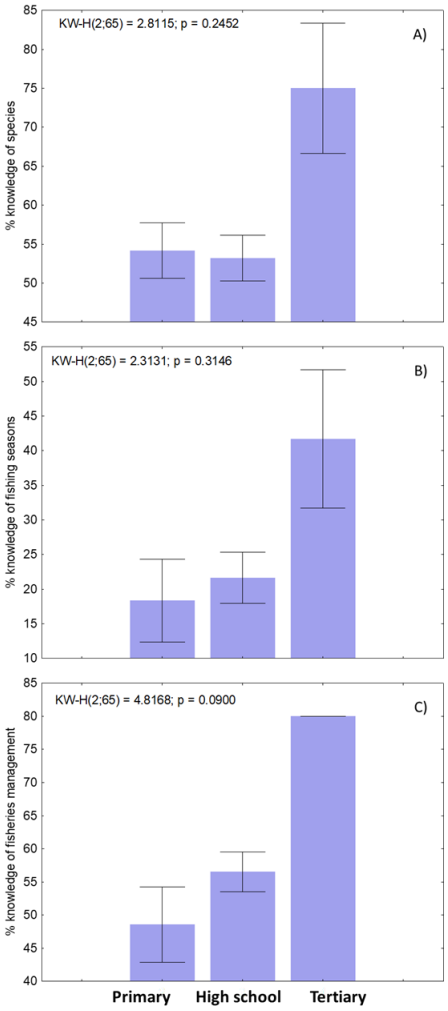

Figure 3. Knowledge of the country's seafood products, according to the level of professional training; A) species, B) fishing seasons and C) management. The summary of Kruskal Wallis nonparametric test and p level is shown on the upper left corner.

Table 4. Knowledge of fisheries management and consumption of sea products by chefs in Uruguay (% of correct answers).

Knowledge aspect	N	%
Responsible institutions		
All corrects answers	38	56.7
Half correct answers	20	29.9
Main regulations		
Closures	48	71.5
Sizes	1	1.5
Protected Areas	7	10.4
No answer	12	16.9
Permitted size		
Yes	3	4.47
No	37	55.2
Some	24	35.8
No answer	3	4.47
Periods of prohibition		
Yes	30	44.8
No	16	23.9
Partially	19	28.4
No answer	30	3
Overexploitation		
Yes	44	65.7
No	18	26.9
No answer	5	7.4

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3.2 Attitudes

Attitudes towards using seafood in the gastronomic business were positive (Table 5). Nearly 90% of respondents believe that offering seafood is essential and it is necessary to encourage its use in the country. Great importance is also given to the fact that seafood can be considered a typical regional dish. Furthermore, most respondents believe in strengthening fishing regulations to ensure a sustainable product. Concerning the attitude towards the perception of seafood by commensals, many think that Uruguayan consumers do not appreciate the proper preparation of these products. Similarly, contradictory opinions were found in the same percentage concerning the difficulty in preparing them.

Table 5. Assessment of attitudes towards seafood products by chefs in Uruguay.

	1	2	3	4	5	6	7	8	9	10
How important do you think it is to offer seafood in restaurants in the country?										
% of answers	0	0	0	2	2	2	0	15	17	63
Do you consider it important to encourage the use of seafood in the country?										
% of answers	0	0	2	0	0	0	3	5	5	85
To what degree do you think seafood could be considered a "typical dish" on your region?										
% of answers	0	3	2	3	5	5	17	15	8	37
Do you consider it important the strengthen of the fishieries management to promote sustainability?										
% of answers	2	0	5	0	0	0	4	0	11	78
Do you think that the preparation of seafood is more difficult (complex or risky) than that of other proteins?										
% of answers	20	3	12	8	10	7	19	14	5	2
Do you think that the Uruguayan consumer appreciates the correct preparation and quality of seafood?										
% of answers	10	7	20	8	12	8	7	12	5	10

Green: Fewer responses, less important, red: more responses, more important.

The professionals' attitudes in gastronomy concerning sea products were independent of the diverse factors considered. In this sense, no significant differences were observed in the aspects consulted according to sex, professional training, experience, age, size or price. Furthermore, the positive perception of the importance of seafood was equal, showing little variability in the answers.

3.3 Practices

Concerning practices, that is, how seafood is used during regular operation of the businesses, the percentages of dishes on different parts of the menus were evaluated, as well as the prominence of the products on the menus (e.g., catch of the day), seafood suppliers, and species preferences by the chefs. The results show the relative importance of seafood, with approximately 50% reporting that 7 of every ten dishes use seafood. In appetizers and snacks, seafood constitutes approximately 35% of the supply, while in main dishes, it reaches 50% (Table 6).

The results show favourable practices regarding the practices related to emphasizing seafood products on the menu. As more than 75% offer catch of the day, almost half provide additional information on the products and the species, which are changed frequently (Figure 4).

Table 6. Role of seafood products in the enterprise's menu.

	1	2	3	4	5	6	7	8	9	10
What proportion of the menu offers dishes that include seafood?										
% of answers	5	2	1	5	5	2	8	8	0	1
According to the type of dish, what proportion contains seafood?										
Finger food										
% of answers	0	3	2	3	5	5	17	15	8	37
Starters										
% of answers	6	7	5	2	2	1	6	0	2	0
Main course										
% of answers	10	7	20	8	12	8	7	12	5	10

Green: Fewer responses, less important, red: more responses, more important.

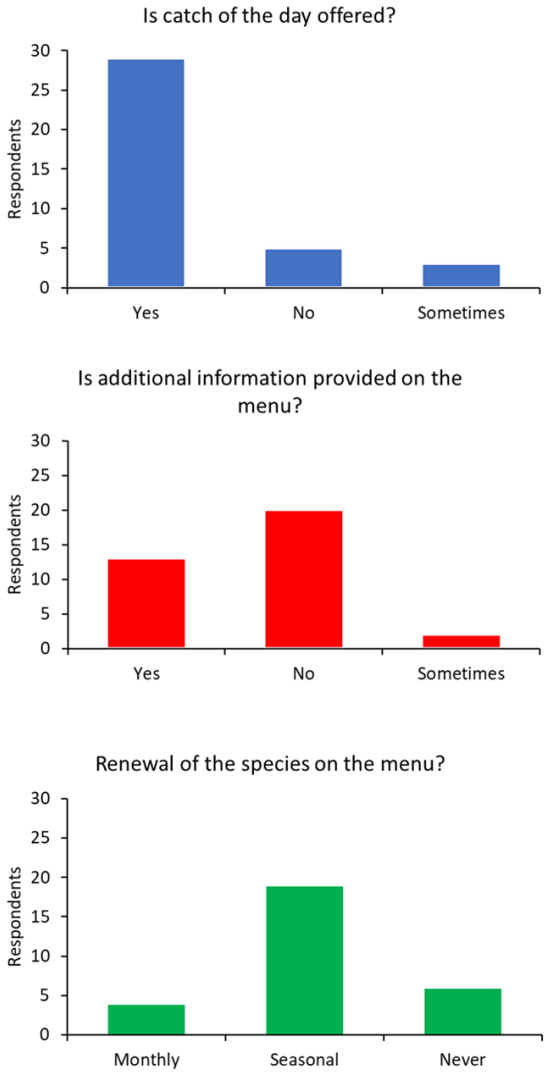

Figure 4. Practices by Uruguayan chefs regarding seafood products reflected in the restaurant menu.

Practices involving seafood acquisition show the importance of seasonal offers, sustainability, and the professional chef's preference for these criteria (Figure 5). Price, size and commensal preference are secondary aspects. For fish and shellfish, the importance of direct trading by small-scale fishers is evident, although wholesale suppliers are just as relevant as direct purchases in the case of shellfish. The proportion of

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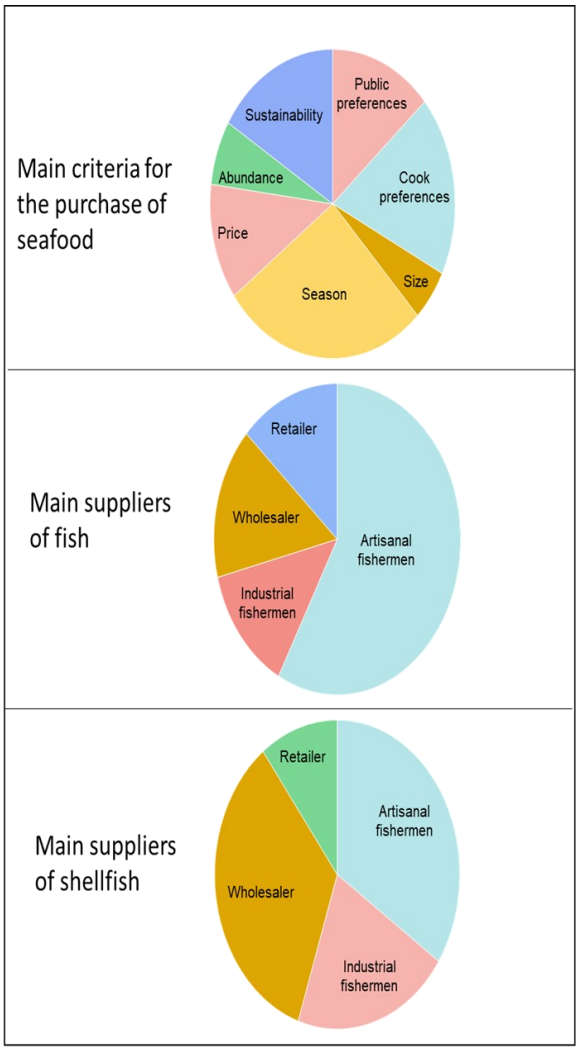

Figure 5. Practices in the gastronomic businesses with regard to the purchase of seafood.

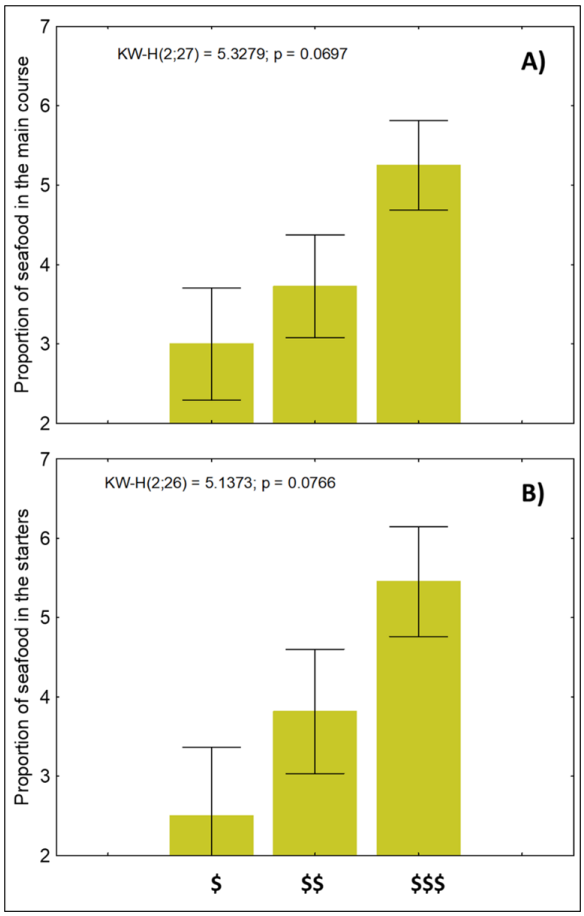

Figure 6. Practices with respect to the proportion of seafood products offered on the menu in relation to the business's prices; (A) proportion in the main course and (B) proportion in the starters. The summary of Kruskal Wallis nonparametric test and p level is shown in the upper left corner.

seafood on the menu and its main dishes was different, considering the average price of the restaurant's dishes. Those more expensive offers a higher proportion of dishes containing sea products (Figure 6). Concerning species preferences, respondents (N = 40) named eighteen species, ten coastal, 4 coming from continental shelf edge and high seas, and four imported. Six stand out as gastronomic target species: sole (70%), whitemouth croaker (57.5%), brazilian codling (52.5%), salmon (50%), southern king weakfish (42.5%), and silverside (40%).

4. Discussion

This analysis shows a low level of seafood knowledge, contrasting with very positive attitudes towards the importance and potential of seafood. Regarding the practices, our study shows considerable variability according to the characteristics of the different professionals consulted.

4.1 Knowledge

Although the respondents have a good education and professional experience on average, more knowledge of seafood is needed. The latter may be due to various factors but could be highly related to the country's long history of low per capita fish consumption and the primary livestock cultural identity (Laborde, 2017; FAO, 2020). On the one hand, since respondents are Uruguayan, the low use of seafood in the childhood home leads to a distancing of the product and the need for more knowledge. On the other hand, training stages focus principally on preparation and/or recipes rather than on the species' biology or the fishing process. Finally, during their professional experience, the cooks would become involved with various aspects of the products through practice, acquiring valuable knowledge about them.

The unfamiliarity with the fishing seasons, the availability of fresh products and the misunderstanding of the origin of fish and shellfish seem particularly worrying when using these resources healthily and sustainably (Olson *et al.*, 2014; Gonzalez-Fischer and Garnett, 2016). Although the general knowledge is generally meagre, the health benefits of eating fish are relatively well known. This last point also reflects consumers' growing concern in the search for healthy foods (Laborde, 2017) and the medical recommendation

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to increase fish consumption. It is also evident that certain species are better known than others, for example, silversides and brazilian codling. Even though they are neither the most captured nor commercialized, they are popular, and their respective origin was correctly identified. The slightest knowledge registered in shellfish and algae than for fish is also evident, which coincides with the even lower consumption of these products in the country (Mazza-Pérez, 2008). The lack of knowledge about some species was also observed in Peru, where fish and shellfish are central in such cuisine (López de la Lama *et al.*, 2018).

Regarding the knowledge of fisheries management, the institutional aspects are relatively well understood, and the need for management measures in the face of overexploitation is comprehended. However, the great ignorance about minimum sizes allowed for fishing stands out. The latter is a critical point since specialized buyers such as chefs could favour the commercialization of specimens that infringe legal measures. Further, until today there have yet to be official information brochures to distribute to restaurants or consumers about this topic. Another aspect that stands out in the evaluation of knowledge is the importance of the grade of professional training. As expected, the respondents with a higher formal gastronomic education generally have a higher level of expertise. The latter was mainly observed regarding species and season knowledge and fisheries management. Therefore, the importance of formal education for knowledge of seafood products, proper preparation and sustainability has been recognized as the decisive factors for consumers (Aydin *et al.*, 2011; de Moura *et al.*, 2012; Casini *et al.*, 2015).

4.2 Attitudes

Attitudes towards using seafood in gastronomic businesses were highly favourable in most aspects. Offering seafood is very important from a culinary point of view. In this sense, it stresses the importance of encouraging the use of seafood in the country and increasing per capita consumption. Furthermore, the vast majority believe it is indispensable to strengthen fishing regulations to ensure sustainable products. This is consistent with what was observed in Peru, where a transformation of chefs as agents of change was generated, seeking gastronomic sustainability and bringing this wisdom to consumers (López de la Lama, 2014). Regarding the attitude perception of diners towards seafood, Uruguayan consumers do not seem to value the effort of good preparation. At the same time, almost half of the surveyed chefs find it challenging to cook seafood. Interestingly, the same attitudes are shown regardless of the degree of training, experience, etc., which denotes excellent coherence at the country level about the importance of seafood in the diet and awareness about the low level of consumption in the country. It is pertinent to point out that other actors are necessary to generate the abovementioned change, considering that the fishing process includes catching, post-harvest processing and trading.

4.3 Practices

On average, seafood is included in more than half of the dishes offered on the menu (except desserts). It could be considered a high percentage in the country's cultural context but low if the enterprises selected for the study are in the coastal area and were selected for their affinity to the cuisine of fish and seafood. Therefore, menu design could be worthy for future seafood diffusion and consumption in the country (Filimonau and Krivcova, 2017). In this sense, products are offered mainly as main dishes and, to a lesser extent, as entrees, which restricts the importance of these products in businesses. This relevance is reinforced using other favourable practices, such as the "day caught local fish" and renewal of the species offered due to the adaptation and recognition of the seasonality of most species.

The practices related to the acquisition of products are consistent with the sustainable use of resources, with emphasis on quality; however, fish size is rarely considered. Most of these businesses directly acquire the catches made by small-scale fishing to obtain fresh products and lower prices by avoiding intermediation. The choice of the chefs coincides with the view that small-scale fishing is more selective, produces less environmental impact and generates more jobs per kilo of fish than industrial fishing (Defeo *et al.*, 2008). Buying directly from fishermen avoids intermediation, one of the main problems of small-scale fisheries in Uruguay (Bértola *et al.*, 1996). In the case of shellfish, small-scale fishing remains an important supplier. However, seasonality and restricted distribution of national shellfish (mussels, blue crab, clams, etc.) determine the use of various imported products (Mazza Perez, 2007). Species preference showed a great diversity of coastal species (N=10), including the most landed species within the small-scale fleet (N=19) (DINARA, 2019). Target gastronomic preferences coincide with the species that showed the highest percentage of knowledge about its origin including salmon imported from Chilean aquaculture. Sole stands out clearly in the preferences.

Businesses of different price ranges have varying practices when it comes to their menu offerings. In general, more expensive establishments tend to offer a larger proportion of seafood dishes. This aligns with the

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observation that the wealthiest individuals tend to consume more seafood (Love *et al*., 2020).

5. Conclusion

The group of professionals studied shows little knowledge about the biology and fishing processes of seafood in Uruguay. In contrast, attitudes toward promoting these products can be viewed as highly positive. This reflects professionals' awareness concerning the little use of seafood in the country and the desire to generate a change in consumption, reflected in the general menu. However, certain practices should be optimized to encourage the sustainable use of resources: considering the legal size as a purchase criterion and greater use of species caught and marketed by small-scale fishing. Better knowledge of these products is needed to improve sustainable and healthy practices, where gastronomic education institutes could help by strengthening their training programs. It is necessary to emphasize that, in the country, in recent years, formal initiatives have arisen that seek to encourage the use of sustainably local seafood products and promote the interest of consumers in this type of goods (National Institute of Food Services, Honorary Commission for Cardiovascular Health, Slow Food Uruguay, the Uruguayan Gastronomic Association or the Eastern Oceanic Pact). These initiatives have been promoting local fish consumption by organizing different activities for the public, constituting fundamental pillars to induce changes in the consumption of seafood in the country.

Conflict of interest

The authors declare no conflict of interest.

Acknowledgments

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