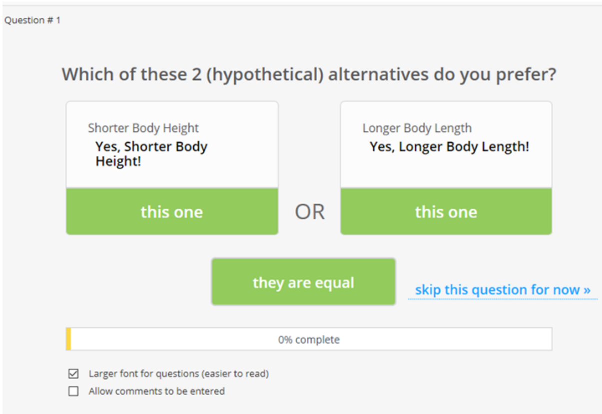
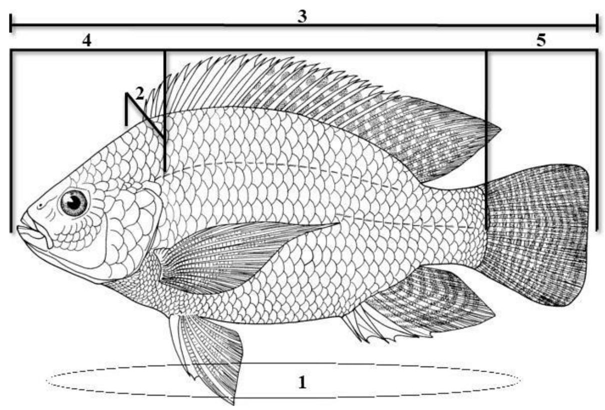
1,000 minds ranking software:
Survey tools for identifying consumers' selective trait preferences





Tools for identifying gender responsive selection traits

There is compelling evidence that tilapia selective breeding programmes require inclusion of gender analysis to deliver more specific and accurate end-user information appropriate for developing and monitoring pro-poor breeding objectives.

Whether applying mixed methods to front-end, social-targeting analysis of value chains, or involving value chain actors in on-farm trials and point of sale strain evaluations, these initiatives present effective tools for identifying key traits that are both ‘measureable’ and ‘actionable’ (Ragot et al., 2018), ultimately benefitting low-income women and men consumers and retailers.

Building on the work of Dey et al. (2008) and others, farmed fish demand models designed to evaluate bottom of the pyramid markets for different tilapia products and meanwhile identify tilapia trait preferences of different end-users would benefit from a number of methodological innovations. Products are differentiated not only by species but also by different grades, indicating that there is need for research that examines how different farmed fish products serve different economic and social groups by taking into account end-user preferences for morphometric and organoleptic traits and attempting to rank these traits in terms of their market demand among different end-user groups.

A method frequently used to determine consumer response towards different product attributes is conjoint analysis (Cox et al., 2007; Green and Srinivasan, 1990; Grunert, 1997; Helgesen et al., 1998; Furnols et al., 2011), which applies a pairwise comparative method to estimate an evaluation by respondents to multiple combinations of product traits (Claret et al., 2012). This has led some to carry out choice modelling with the use of adaptive software, which limits the number of preference questions based on previous choices. These have been considered appropriate methods that provide realistic choice scenarios to respondents when a select number of traits are being evaluated (Slagboom et al., 2017).

Egypt sampling

During peak the months of October and November of 2017, the study surveyed 739 low-income consumers (474 women, 265 men) who were identified as key respondents capable of answering questions onfish consumption and tilapia trait preferences in their households.

Measurement categories of 24 morphometric and meristic variables were estimated from six tilapia traits following the conventional approach outlined by González et al. (2016). A random sampling of the four commonly graded tilapia products was conducted in two retail markets of Zagazig and Abou Hammad cities, with ten samples measured of each grade to calculate a means and standard deviation in centimetres and kilograms. To avoid artificial error, lineal morphometric measurements were taken on the left hand side of the carcass by the same person using a measuring board, mechanical callipers and an electronic weighing scale (Figure 3).

To assist accurate estimation of these measurements, interviewers offered respondents life-size picture aids of four grades of Nile tilapia carcasses and a diagram indicating parts of the fish being measured (Figure 3, 4).

Table 1. Measurement of morphometric trait variables

Morphometric variables	Description
1. Size (Body weight)	Measured as total weight including gut and gonads
2. Width (Body width)	Measured with a calliper at the first ray of the dorsal fin
3. Length (Total length)	Measured from middle of the upper lip of the mouth to the caudal end of the caudal fin
4. Head size (Head length)	Measured from the most cranial point of upper lip to the rear end of the operculum
5. Tail size (Tail length)	Measure with a calliper from front end to rear end of caudal fin
6. Bone-to-fillet ratio	Reported as presence of bones by consumers' experience of touch and filleting

Table 2. Morphometric trait dictionary

Morphometric trait variables (1st to 5th rank, max score = 5.0)			
Variable label	**Trait measurement**	**Trait variable**	**Trait measurement**
1.1. Size – Grade I	Body weight μ 441.50gm ± 54.50	**1.2.** Size – Grade II	Body weight μ 298.50gm ± 37.94
1.3. Size – Grade III	Body weight μ 184.50gm ± 32.01	**1.4.** Size – Grade IV	Body weight μ 51.50gm ± 24.50
2.1. Width – Fat	Body width μ 4.12cm ± 0.20	**2.2.** Width – Medium	Body width μ 3.85cm ± 0.16
2.3. Width – Slim	Body width μ 2.81cm ± 0.21	**2.4.** Width – Skinny	Body width μ 1.92cm ± 0.20
3.1. Length – Long	Total length μ 26.97cm ± 0.99	**3.2.** Body Length – Med.	Total length μ 23.66cm ± 0.80
3.3. Length – Short	Total length μ 21.14cm ± 0.96	**3.4.** Body Length– Stumpy	Total length μ 13.46cm ± 1.97
4.1. Head size – Large	Head length μ 6.89cm ± 0.32	**4.2.** Head size – Medium	Head length μ 6.04cm ± 0.30
4.3. Head size– Small	Head length μ 5.60cm ± 0.31	**4.4.** Head size – V. Small	Head length μ 3.71cm ± 0.52
5.1. Tail size – Large	Caudal fin μ 4.88cm ± 0.33	**5.2.** Tail size – Med.	Caudal fin μ 4.52cm ± 0.21
5.3. Tail size – Small	Caudal fin μ 3.96cm ± 0.24	**5.4.** Tail size – V. Small	Caudal fin μ 2.75m ± 0.36
6.1. Bones-to-fillet ratio	'I love bones'	**6.2.** Bones-to-fillet ratio	'Bones are okay'
6.3. Bones-to-fillet ratio	'I dislike bones'	**6.4.** Bones-to-fillet ratio	'I prefer fillet only'

Figure 3: Market-based sampling of tilapia morphology

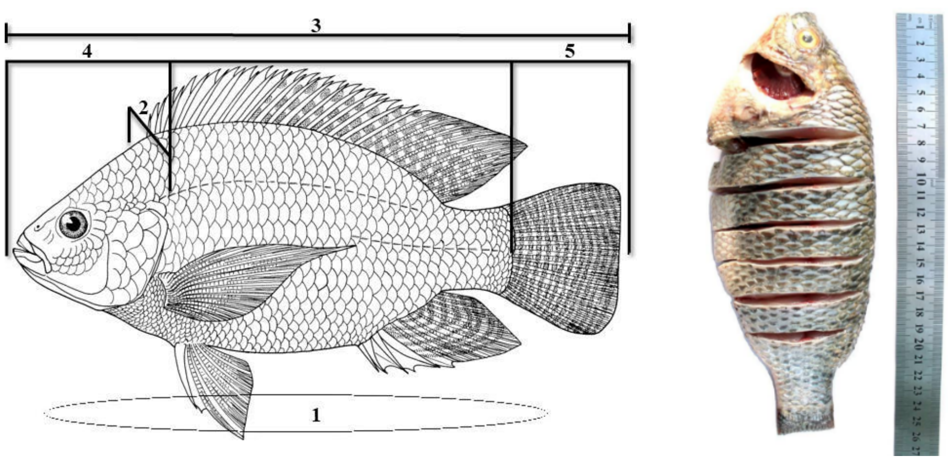


Figure 4, 5; Interview picture aids (source: adapted by author from Hassanien et al. 2011; Kosai et al. 2014; Rocha et al. 2012; Bogard et al., 2018)

Zambia Sampling

In 2015, a CGIAR research project was deigned to investigate farmed fish traits preferences of resource-poor consumers and retailers, in order to identify implications for pro-poor and gender-responsive genetic improvement programmes in Zambia. The main research questions guiding this project include:

1. What fish species and traits do poor and vulnerable consumers prefer? And do these differ by sex of the consumer and why?
2. What fish species and traits do poor and vulnerable retailers prefer? And do these differ by sex of the retailer and why?
3. What and how can these results contribute to the design and sampling of a 2018 quantitative fish demand survey)?

This project adopted a mixed methods approach to investigate fish preferences from multiple perspectives over two stages of inquiry (Creswell et al., 2011; Creswell and Clark, 2017; Fetters et al., 2013; Johnson et al., 2007; Kelle, 2006; Tashakkori and Creswell, 2007). In October and November of 2017, a qualitative scoping study was conducted using individual case studies and focus group discussions.

Findings from this scoping study were used to inform the design and implementation of a quantitative survey of trait rankings, which was carried out in June of 2017.

The initial, exploratory scoping study was implemented in quarter 4 of 2017, with primary objective to surface a dictionary of “measureable and actionable” traits (Ragot, 2017; Ragot, Bonierbale, & Weltzein, 2018). This objective was three-fold in its deliverables. On the one hand, the qualitative survey sought to identify locally relevant descriptions of genetically ‘actionable’ traits from across a diverse sample of end-users. Respondents’ fish characterisations were recorded and transcribed to help identify priority traits among sub-samples, which were disaggregated by location, gender, and income groups. On the other, the study sought to identify if fish preferences differ significantly between these subsets of resource-poor women and men retailers and consumers.

Initially, trait dictionaries from multiple stakeholder groups were used to interpret and categorize priority traits between groups. Breeding constraints often cited in the literature relate to limits of trait inclusion in selection indices. Some studies caution over poor response of specific traits in genetic gain across different environments (Eathington, Crosbie, Edwards, Reiter, & Bull, 2007).

Lower-income Men Consumer Preferences	Species and/or Grade	Priority (1-3)	Added details of preferred characteristics - (inquire context of purchasing decisions, household consumption behaviour, reasons for preference or need, market environment etc.)
Carcass Size			
Head Size			
Tail Size			
Flesh Colour			
Flesh Texture			
Fillet/Bone Ratio			

Table 1. Low-income consumer trait dictionary

For the 2018 Zambia tilapia trait ranking survey, the 1000 minds conjoint analysis software toolkit was used[1]. Estimating weights of preferences given by respondents, the pairwise toolkit (PAPRIKA) represents the relative importance of traits given by respondents according to alternative product profiles. This choice-modelling method facilitates a step further than standard conjoint analysis tools. Using predictive algorithms, this software reduces the number of permutations between traits. With the aim of providing a more realistic choice scenario, this approach limits interviewing time by limiting repetition of questions based on negative responses to specific traits.

[1] https://www.1000minds.com/conjoint-analysis

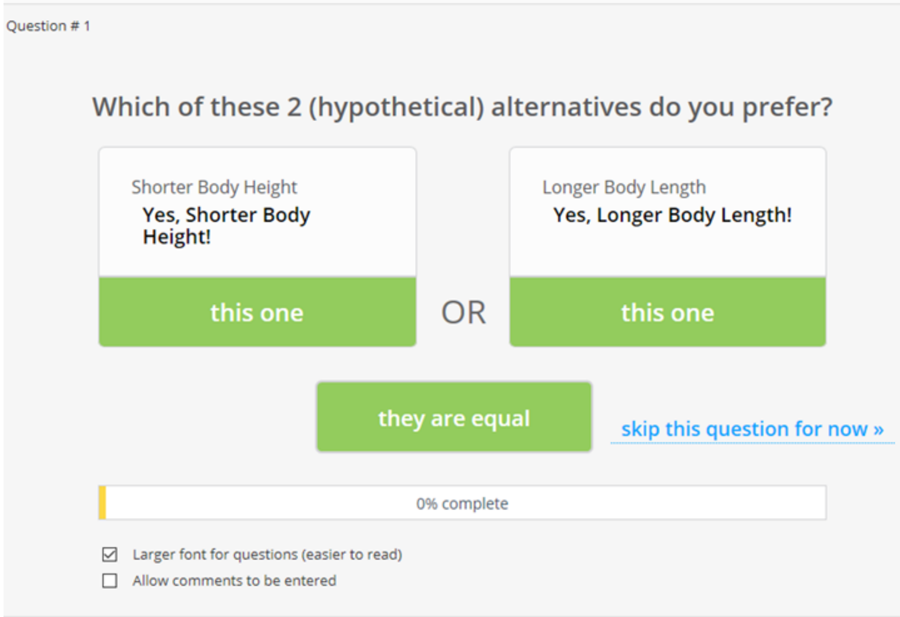
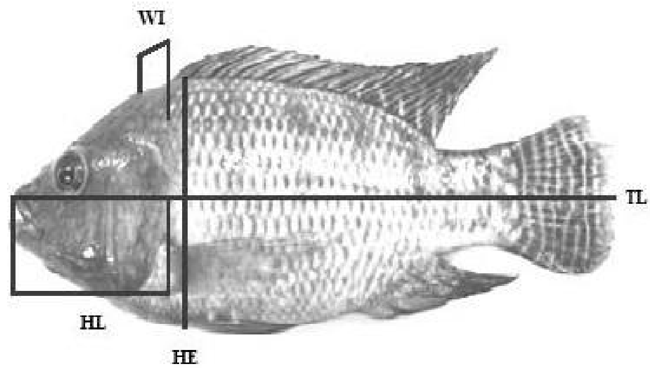


Figure 2. 1000-minds pairwise comparison online tool

Conjoint Analysis:

A method frequently used to determine consumer response towards different product attributes is conjoint analysis. Conjoint analysis has been recognised as an established method by academic and industry standards valued for measuring end-users' trade-offs "among multi-attributed products" (Cox, Evans, & Lease, 2007; Green & Srinivasan, 1990; Grunert, 1997; Helgesen, Solheim, & Næs, 1998; i Furnols et al., 2011). "Conjoint measurement" refers to any pairwise comparative method used to estimate the structure of consumers' evaluation of multiple combinations of product traits (Claret et al., 2012). This method is used in marketing research to determine the rankings of fish traits among potential retailers and consumers' preferences. For the 2018 Zambia tilapia trait ranking survey, the 1000 minds conjoint analysis software toolkit will be used[2] to develop questionnaires that ranks "actionable" traits and "measureable" alternatives. Conjoint analysis is also known as choice modelling or discrete choice experiments. These models provide tools for analysing key priority traits with two or more levels of 'measurements' of specific traits. Estimating weights of preferences given by respondents, the pairwise toolkit (PAPRIKA) represents the relative importance of traits and the ranking of particular product profiles or alternative products according to sub-samples and specific inputted into the model. This facilitates a step further than standard conjoint analysis to adaptive (choice-based) conjoint-analysis.

[2] https://www.1000minds.com/conjoint-analysis



1. TL - total length; HL - head length; HE - height; WI - width.

Figure 1. Key morphometric traits of the tilapia genus (Rocha, Simões, Paiva, & Gomes, 2012)

Interviewers first asked respondents to rank their preferred size according to the three grades commonly used in their markets. Respondents were then asked to rank their preferred sensory and morphometric traits according to their own interests.