

# European consumer preference for African dried fruits

Roselyne Alphonse

*School of Economics and Business,  
Norwegian University of Life Sciences, Ås, Norway*

Anna Temu

*Department of Agricultural Economics and Agribusiness,  
Sokoine University of Agriculture, Morogoro, Tanzania, and*

Valérie Lengard Almlí

*Nofima AS, Ås, Norway*

## Abstract

**Purpose** – The purpose of this paper is to assess European consumer preference and willingness to pay (WTP) for tropical dried fruits from Africa. The paper specifically investigates sensory and credence characteristics driving consumer preferences.

**Design/methodology/approach** – Data on sensory descriptive analysis and hedonic evaluation for seven samples representing three fruit types: mango, pineapple and banana, were collected together with data on Country of Origin (COO) preferences and WTP for conventional, organic and fair-trade labelled dried fruits, among Norwegian consumers ( $n = 96$ ).

**Findings** – The results show that consumer preferences for a dried fruit are affected significantly by its typical aroma intensity and consumers are willing to pay a premium for both organic and fair-trade products. Two consumer groups expressing distinct COO preferences for tropical dried fruits and a third group with no country preferences are revealed.

**Originality/value** – This study provides useful insights for dried fruit producers and market strategists in tropical countries attempting to position value-added products for maximum revenue.

**Keywords** Organic foods, Consumers, Fair trade, Willingness to pay, Country of Origin (COO), Sensory analysis, Dried fruits

**Paper type** Research paper

## Introduction

To increase the value of products in the world market, producers of dried fruits in developing countries must understand consumer preferences in high-income markets. In this paper, we contribute to the understanding of European consumer preferences and willingness to pay (WTP) for tropical dried fruit snacks from Africa. Specifically, we assess consumers' sensory acceptance of dried fruits and their preferences for organic, fair trade and Country of Origin (COO) attributes.

There has already been a number of studies on organic, fair trade and COO attributes conducted in European countries (Didier and Lucie, 2008; Menapace *et al.*, 2011; Poelman *et al.*, 2008). Therefore, the aim of this study is not to identify consumer preferences for these attributes in general, but rather to understand which attributes help increase the value of tropical dried fruits from Africa. In particular, our study will attempt to investigate consumer preferences towards COO from Tanzania. If consumers perceive a Tanzanian origin as a positive attribute, marketers can use COO as a quality cue. If viewed negatively, then they have to develop ways to minimize the effect. This can possibly be done by using credence attributes such as naturalness, fair trade and organic.



Exports of fruits and other horticultural products from developing countries to Europe are characterized by significant uncertainty because of the perishability of the products, unreliable supplies (seasonal variability) and strict quality standards. These challenges could be reduced by exporting solar-dried fruits from these countries. Solar-drying technology can increase shelf life and the reliability of supply and is easily adopted among small-scale farmers and entrepreneurs. This technology can create business opportunities for small-scale farmers and thereby increase household and national income. Agona *et al.* (2002) studied the market for dried fruits in Europe and found a potential demand for dried fruits, yet little is known about the sensory and credence attributes consumers want from dried fruit snacks from Africa.

Depending on how consumers view and use dried fruits in Europe, dried fruits can be considered as functional, convenient, healthy or luxurious products. Some consumers use dried fruits as a snack for energy, while others use dried fruits as a convenient product for baking, or healthy and functional product added in breakfast cereals (Centre for the Promotion of Imports from Developing Countries (CBI), 2014; Jesionkowska *et al.*, 2008, 2009).

In Europe at least 80 per cent of the dried fruits end up in breakfast cereals and the confectionery industry (Centre for the Promotion of Imports from Developing Countries (CBI), 2014). Hence in Europe dried fruits sold as a snack can generally be categorized as niche products. In supermarkets, dried fruits are typically sold in 25-250 g packets, where a typical “on the go snacking package” ranges between 25 and 60 g ([www.whitworths.co.uk/Products/on-the-go-snacking](http://www.whitworths.co.uk/Products/on-the-go-snacking)). Popularly sold dried fruits in these markets include, raisins, figs/dates, sultanas, plums and apricots. Tropical dried fruits like mangoes, bananas and pineapples are among the rare dried fruits which have just started to be popular in healthy stores (Centre for the Promotion of Imports from Developing Countries (CBI), 2014).

Therefore, because of the high failure rates for new food products in the food sector, a consumer preference study in Europe will help in strategizing the best way for African dried fruit snacks to penetrate the European market. Thus to be able to develop marketing strategies for African dried fruit snacks in Europe, the main objective of the paper is to investigate consumer preferences and WTP for dried fruit snacks in connection to the products’ main intrinsic and extrinsic properties: their sensory characteristics and credence attributes.

## Literature review

### *Consumer food choices*

Human health, food safety and environmental concerns, along with other characteristics such as nutrition, taste, freshness and appearance influence consumer preferences for food products (Kvakkestad *et al.*, 2011; Lusk and Briggeman, 2009). However, there are different theories that explain consumers’ food choice behaviour. The classical frameworks of consumer behaviour propose that food choices are the results of consideration of intrinsic (e.g. colour, texture, taste) and extrinsic (e.g. price, brand name, origin, packaging) factors moderated by consumer demographic and socio-economic characteristics.

Intrinsic factors are part of the physical product, like the physical appearance of the product, its ingredients composition and its organoleptic properties, that cannot be changed without changing the product itself (Olson, 1977; Olson and Jacoby, 1972). Intrinsic cues include search and experienced attributes such as vitamin content and sweetness, while extrinsic factors are related to the product but are not physically part

---

of it (Olson, 1977). Extrinsic cues include search and credence attributes such as price, healthiness and organic production.

For the search and experienced attributes consumers can verify quality. For search attributes, quality can be verified prior to purchase (e.g. food colour and brand name); while for experienced attributes quality is verified after consumption (e.g. aroma and sweetness) (Nelson, 1974). On the other hand, credence attributes are properties that can never be verified by consumers even after having consumed the good, but have perceived value to them, e.g. fair trade and organic (Darby and Karni, 1973).

Because credence attributes can be claimed on a product packaging but cannot be sensed or experienced by the consumer, information about products with credence attributes is asymmetric. Therefore for credence attributes, information on the quality of the product is only known to the supplier, and labelling based on third-party certification is usually used to mitigate the asymmetric information problem (Giannakas, 2002). With such products, for an efficient market to exist, consumers need to trust labels or any signals used to claim a credence attribute.

As consumers in Europe and other developed countries are becoming more critical in their food choices, the use of third-party certification has become very popular for credence attributes related to healthiness, environmental benefits, fair trade and animal welfare (Didier and Lucie, 2008; Harper and Henson, 2001; Rijswijk *et al.*, 2008). It is also surprising to see how consumers have learned to use extrinsic cues to form quality perceptions about intrinsic attributes, for instance organic production, animal welfare and COO are sometimes used as a cue for better taste or product safety (Alphonse and Alfnes, 2012; Grunert, 2005; Illichmann and Abdulai, 2013; Schjøll, 2014).

#### *European consumer preferences for organic and COO attributes*

Attributing health benefits to organically grown food due to intensive food production systems, and fearing food poisoning, antibiotics, hormones and related scandals within the food industry, European consumers tend to prefer organic to conventional produce (Didier and Lucie, 2008; Hughner *et al.*, 2007; Kvakkestad *et al.*, 2011; O'Donovan and McCarthy, 2002).

For example, Norwegian consumers identify pesticides and antibiotics as the most important factors for choosing organic foods (Kvakkestad *et al.*, 2011; Schjøll, 2014). The literature also reports that because of trust, consumers use COO as a proxy for food safety, tradition and taste, and they prefer domestic products to imported products (Illichmann and Abdulai, 2013; Kvakkestad *et al.*, 2011; Schjøll, 2014). Such consumers are willing to pay a greater premium for conventional domestic products than for organic foreign products. For example, in a study assessing the domestic bias for organic food, Schjøll (2014) found that Norwegian consumers preferred and were willing to pay more for domestically labelled meat than they were for foreign organic meat. Consumers not only prefer products originating from their own country, but also tend to discount imported products from developing countries, such as those in Africa, compared with imported products from developed countries (Alfnes, 2004).

Studies from non-European countries also report consumer preferences for domestic products, and product discounts from less-developed countries. For example, Constanigro *et al.* (2010) found that Colorado consumers preferred local to imported organic apples despite the apples being certified by the US Department of Agriculture; and Juric and Worsley (1998) found that New Zealand consumers poorly rated products from Hungary and Thailand, compared to Australia and the USA in terms of safety, nutritional value, quality and the environment. These studies show that consumers'

expectations and perceptions of food products from less-developed countries could influence their WTP for these products.

Besides health, safety and trust issues, some consumers prefer organic products because of their taste and their concerns for animal welfare and the environment (Kvakkestad *et al.*, 2011; Makatouni, 2002; Olesen *et al.*, 2010; Schjøll, 2014; Shepherd *et al.*, 2005; Torjusen *et al.*, 2001).

In the literature the term “organic” is often confused with terms like “green”, “ecological”, “environmental”, “natural” and “sustainable” (Hutchins and Greenhalgh, 1995; McDonagh and Prothero, 1997; Schifferstein and Ophuis, 1998). However, despite consumers being inconsistent in their interpretation of what is organic; throughout the literature consumers mostly associate organic with naturalness and greenness (Aarset *et al.*, 2004; Olesen *et al.*, 2010; Yiridoe *et al.*, 2005).

### *European consumer preferences for fair trade*

Consumption of fair-trade products is seen as a solidarity-based commitment by consumers in developed countries, whose concerns mainly relate to the well-being of workers and farmers in developing countries. In 2011, worldwide fair-trade sales were up 12 per cent to \$6.6 billion (Huet, 2013). Between 2009 and 2011, Australia and New Zealand increased sales by 258 per cent, Czech Republic by 386 per cent, UK by 40 per cent, Germany by 27 per cent and Norway by 16 per cent (Fairtrade International, 2012). The widespread use of fair-trade labels for cocoa, sugar, bananas, wine and spices are one reason for a large increase in fair-trade sales of these products.

Studies on fair trade have mostly been done on fair-trade coffee, which is probably because it was the first product in the late 1980s to be certified with a fair-trade label. In most of these studies, the results show consumers are willing to pay a price premium for fair-trade labels (Cailleba and Casteran, 2011; De Pelsmacker *et al.*, 2005; Didier and Lucie, 2008; European Commission DGVI, 1997; Mahé, 2010; Rotaris and Danielis, 2011). For example, in a Eurobarometer survey conducted in the European Union in 1997, 70 per cent of the consumers were willing to pay at least a 10 per cent premium for products with a fair-trade label.

## **Methodology**

### *Study design*

A total of 96 participants aged between 19 and 64 years old were recruited at a university town in Norway. They completed both a sensory evaluation and a market survey, including WTP questions using a contingency valuation form and hierarchical questions on the motivation underpinning consumers' choice for a COO.

A summary of the socio-demographic characteristics of the participants is presented in Table I. As indicated in Table I, the sample in this study is characterized by high education (64.6 per cent university education) and youth age (mean age 28.7 years) as compared to the general Norwegian population, and may not be a representative of all segments of the Norwegian population. This segment is particularly interesting to study in the perspective of healthier snacking, which has been found to appeal to higher education groups in Europe (Wandel and Bugge, 1997; Yue *et al.*, 2010). As a result, the findings in this study mainly apply within the characteristics of the sample and generalization to the overall population remains speculative. However the large variation in the sample allows studying within sample differences in terms of age and education. In this sample, 64 per cent of the participants were dried fruit consumers with a consumption frequency of at least once a month.

**Table I.**  
Socio-demographic  
characteristics

Variable	Study sample	National census data per 2011 <sup>a</sup>
Mean age (years)	28.7 (SD 11.2)	
19-29	76.0%	
30-39	10.4%	
40-59	12.5%	
60-69	1.0%	
Gender (%)		
Female	59.4%	50.9%
Male	40.6%	49.1%
Education (%)		
Secondary or lower	2.1%	28.6%
High school	33.3%	42.3%
University	64.6%	29.1%
Consumption frequency <sup>b</sup>	0.64 (0.5)	

**Notes:** <sup>a</sup>National census data is reported for age group 30-70 (which could have attributed to low number of university education); <sup>b</sup>1 = high (at least once a month), 0 = low (at most once in the past six months)

### *Product samples*

The participants tested dried fruit samples of four types: banana, pineapple, mangoes from cultivars Dodo (a local cultivar in Tanzania) and Keitt (a hybrid cultivar). The fruits were either cabinet or tunnel dried in Tanzania before they were exported to Norway. There were four cabin-dried and three tunnel-dried fruits, producing seven samples for consumer testing. Because of the maturity variations between fruits before entering the different dryers, the dryer effects should be interpreted with caution.

### *Sensory evaluation*

For each sample, the participants first performed a descriptive sensory analysis on attributes hardness, sweetness, acidity and aroma. During this task, participants were asked to give an objective evaluation of each attribute's intensity. Nine-point Likert scales anchored from, e.g. "Not aromatic" to "Very aromatic" were used. Although the method is more suitable for trained assessors, high similarities between trained and untrained panels have been reported with respect to important performance criteria like discrimination and consensus (Worch *et al.*, 2010). Then the participants evaluated their overall liking on a nine-point unstructured Likert scale anchored from "I don't like it at all" to "I like it a lot". In this task, the participants gave a subjective hedonic evaluation of the samples. The participants tested the fruits in random order, but always took samples from the same fruit variety consecutively. The samples were marked with a three-digit random code, and participants tasted the samples in the order listed on the questionnaire. Water was available to rinse their mouth between samples.

### *Market data*

The market survey used a short questionnaire following the sensory evaluation session. Participants first indicated their most preferred dried fruit among the three evaluated fruits (bananas, pineapples and mangoes). They then answered contingency valuation questions on WTP for a 50 g packet of: their most preferred dried fruit (conventional condition); their most preferred organic-dried fruit (organic condition);

and their most preferred dried fruit produced and dried by a poor farmer (fair-trade conditions). A 50 g packet size was chosen because it corresponds to a regular portion size in the Norwegian market.

The participants also indicated their preferred COO for dried fruits among five alternatives in Africa, Asia and South America, as well as answering a hierarchical question on the motivation underpinning their COO preferences collected in an open question. Finally, the questionnaire collected the participants' socio-demographic characteristics.

### *Statistical analysis*

*Sensory data analysis.* Internal preference mapping was performed using a partial least squares regression (PLS-R) approach to identify preference patterns among participants as well as to establish a relationship between descriptive sensory attributes and hedonic scores (Næs *et al.*, 2010). Equation (1) presents the model equation expressed in regression coefficients:

$$L_{ij} = \beta_0 + \beta_n A_n + \varepsilon_{ij} \quad (1)$$

where  $L_{ij}$  is the Hedonic score for participant  $i$  for product  $j$  ( $j$  = banana, pineapple, mango Dodo, mango Keitt),  $A_n$  are the independent variables (hardness, sweetness, acidity, aroma), the  $\beta$ 's are the regression coefficients and  $\varepsilon_{ij}$  is a normally distributed error term.

Since we used untrained assessors to evaluate the samples, the data were standardized, allowing us to compensate for individual differences in scale usage.

*WTP analysis.* We estimate the WTP for a 50 g packet of the participants' favourite dried fruit type under three credence attribute conditions: conventional, organic and fair trade. Thus, if participant  $i$  preferred dried bananas the most, then he/she stated his/her WTP for conventional-dried bananas, for organic-dried bananas and for fair-trade dried bananas. As WTP is censored to the left, i.e. zero is the lowest possible WTP value, the common practice used in valuation studies was followed, and Tobit models censored at zero were estimated (Lusk and Shogren, 2007). We estimate the following econometric model:

$$WTP_{ij} = \beta_0 + \beta_n X_n + \varepsilon_{ij} \quad (2)$$

where  $WTP_{ij}$  is the WTP of participant  $i$  for a 50 g packet of their most preferred product under credence attribute condition  $j$  ( $j$  = conventional, organic, fair trade) and  $X_n$  are the independent variables (gender, age, education, frequency of dried fruit consumption and a series of dummies indicating motivations for preferred COO). Open-ended answers from the motivation for preferred COO were coded into three-binary variables: D1 = Experience with preferred COO (contact, travel, previous experience and know/have experience with the country hygiene and fruit quality), D2 = Fair trade (like to support fair trade, support poor farmers, support development policies) and D3 = Neutral (is indifferent to the origin of the dried fruits). The  $\beta$ 's are the corresponding money metric parameters and  $\varepsilon_{ij}$  is the normally distributed error term.

*Cluster analysis.* A principal component analysis (PCA) was performed using the following factors: age, gender, education, dried fruit consumption (frequency), preferred COO for dried fruits (Tanzania, Uganda, South Africa, Brazil and Thailand) and the motivation behind this preference (D1 = Experience with COO, D2 = Fair trade, D3 = Neutral). Then the PCA scores from five principal components (PC) were used in an

agglomerative hierarchical cluster analysis with complete linkage to identify consumer groups favourable to the import of dried fruits from Africa, in particular Tanzania. Multivariate models (PLS-R and PCA) were performed with The Unscrambler X (v. 10.3; Camo Software AS, Oslo, Norway).

## Results and discussion

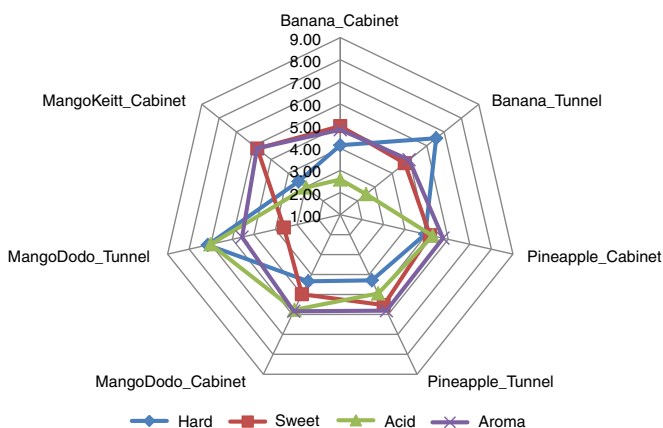
### *Descriptive sensory evaluations*

The profile data analysis showed little agreement between assessors on the descriptive sensory evaluations. A two-way analysis of variance reveals a strongly significant assessor effect on the evaluations ( $p < 0.001$  on each of the four attributes) (PanelCheck v. 1.4.0; Nofima, Ås, Norway). This is expected in data from untrained assessors, as neither attribute recognition training nor scale usage and calibration training are conducted prior to the evaluations[1]. For a description of the classical descriptive analysis as well as novel methods that can be used with untrained assessors/consumers in sensory characterization we refer to Varela and Ares (2014). Importantly, the weaknesses of the descriptive panel in this study were minimized by the low number of descriptive attributes that were evaluated (four), the simple terminology of these attributes (hardness, sweetness, acidity and aroma/taste (“smak” in Norwegian)) and the large number of consumers involved (96, against about ten in a trained panel). This allows us to obtain a clear and significant pattern in the sensory profiles of the products despite the panel not being trained.

Figure 1 presents the sensory characteristics of the seven dried fruit samples based on mean intensity scores from consumers. Significant product differences were detected on the attributes hardness, sweetness, acidity and aroma ( $p < 0.001$ ). The banana samples were moderately sweet and aromatic with low acidity, while the mango samples were aromatic but present different sensory attributes depending on the cultivar and dryer. It is however important to note that, variation in fruit maturity may have occurred in this experiment and conclusions on systematic dryer effects cannot be drawn from this study. Further, pineapple samples are aromatic, sweet, moderately acidic and moderately hard.

### *Hedonic sensory evaluations*

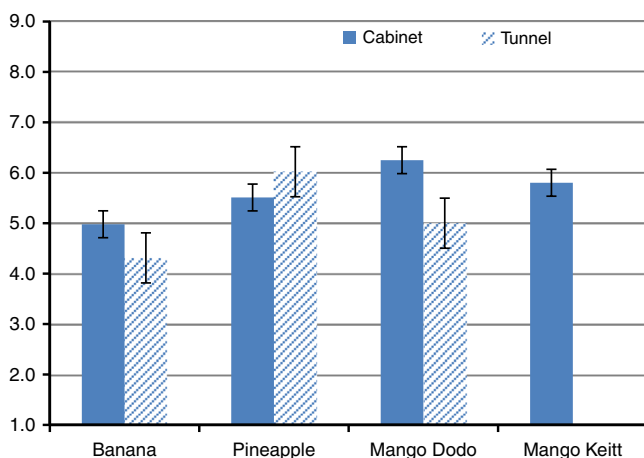
Overall, and across dryers, mangoes were the most preferred fruits (53.1 per cent) and bananas the least preferred (10.4 per cent). Mango Dodo (cabinet-dried samples) had the highest mean hedonic scores, while bananas (tunnel-dried samples) had the



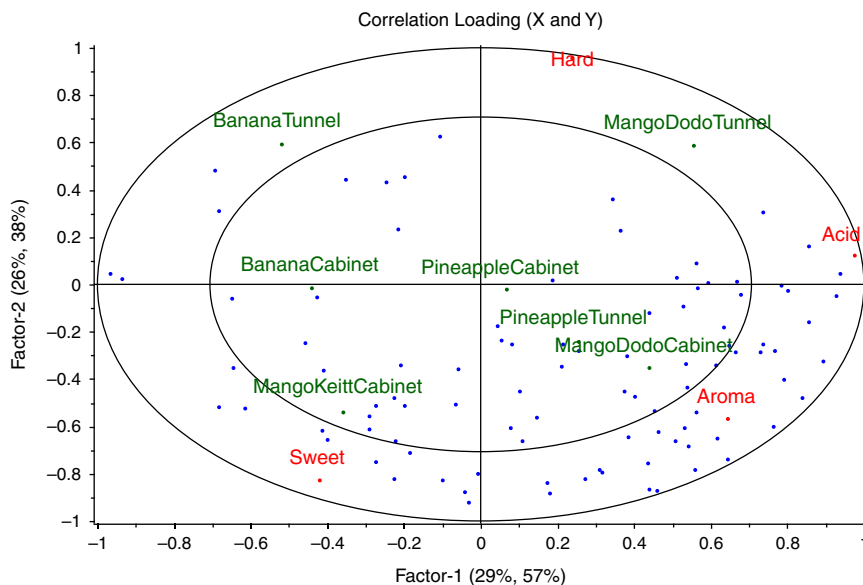
**Figure 1.**  
Descriptive sensory profile of the four dried fruits based on average intensity scores from all consumers

only mean hedonic score under the midpoint (neither like nor dislike) of the nine-point Likert scale (Figure 2).

The internal preference map in Figure 3 presents the seven fruit samples, their descriptive sensory attributes (95 per cent explained variance on two factors) and consumer acceptance (55 per cent explained variance). First, we note from the map the relationships between sensory attributes for this set of samples. A strong fruit aroma tends to be either compatible with high acidity (along Factor 1) or with high sweetness (along Factor 2). Hardness is negatively correlated to sweetness, which may reflect that the



**Figure 2.**  
Mean hedonic scores  
of the dried fruits



**Note:** Unlabelled dots represent the consumers

**Figure 3.**  
Internal preference  
map of the dried  
fruits showing the  
products, their  
sensory attributes  
and consumer liking



hardest fruits were the least mature ones. Second, the map shows that consumers' hedonic scores were positively driven by a strong fruit aroma because most consumers are projected in the direction of increasing aroma intensity. This attribute characterizes mango Dodo from the cabinet dryer and pineapples from the tunnel dryer. Depending on the individual, consumers were in addition attracted either by a sweet taste, projected in the direction of mango Keitt, or by an acidic taste, with better acceptance for mango Dodo from the tunnel drier than consumers were in general. Dried fruits with low aroma (bananas from the tunnel dryer) and high hardness (bananas and mango Dodo from the tunnel dryer) were rejected by a large majority of consumers. In summary, dried fruits of characteristic aroma, moderate hardness and presenting a sweet and sour/acidic balance were the most appreciated. Therefore, to be able to meet the desired attributes, we recommend that dried fruit producers should concentrate on the appropriate harvesting time, appropriate variety and proper standardization of fresh fruits, by measuring the fruit's acidity and sugar content levels before drying. Producers should also be able to control the moisture content of the final product, and through further research identify the drying technology producing the most desirable texture.

#### *Consumer preferences and WTP*

Consumers on average are willing to pay 25 NOK (Norwegian kroner), (1 NOK $\approx$ € 0.125) for a 50 g packet of dried fruits, 29 NOK (16 per cent premium) for organic-dried fruits and 33 NOK (32 per cent premium) for fair-trade dried fruits. These results are in line with studies by Didier and Lucie (2008); and Loureiro and Lotade (2005), where consumers rated fair trade higher than organic and conventional products. However, these WTP estimates are likely to suffer from hypothetical biasness, because we use non-consequential contingency valuation WTP questions (List and Gallet, 2001). Furthermore, a small group of consumers (less than 5 per cent) expressed negative attitudes towards organic-dried fruits and dried fruits produced by poor farmers, while 38 and 20 per cent were neutral towards organic and fair trade, respectively. This could be because some consumers view organic and fair-trade foods as not necessarily having added value compared with conventional products, or it could be that they perceive organic products to be presenting a sanitary risk (Guilabert and Wood, 2012). The study also reports consumers generally (70 per cent) prefer naturally produced products (i.e. dried fruits with neither additives, sugar, nor preservatives added) to products of more stable taste[2]. However, former research indicates that taste is a very important factor for consumer acceptance and cannot be neglected (Lusk and Briggeman, 2009).

Table II presents estimation results for the WTP of a 50 g packet of dried fruits produced under conventional, organic and fair-trade conditions. The first column of results presents the WTP results for conventional-dried fruits, the second column for organic-dried fruits and the third column for fair-trade dried fruits. The results from the econometric models show that the WTP for dried fruits is influenced by gender and education. Female consumers are willing to pay 5 NOK (€0.6) more than male consumers for the dried fruit of their liking (significant at the 10 per cent level), and they are willing to pay an even higher price compared with men for dried fruits with organic (9 NOK, €1.2) and fair-trade (11 NOK, €1.4) labels. These results corroborate previous research, where women were reported to have more altruistic characters and to be more health conscious than men (Chattopadhyay and Duflo, 2004; De Pelsmacker *et al.*, 2005; Yang *et al.*, 2012). On the contrary, Wandel and Bugge (1997) found that men were willing to pay a higher premium

Table II.

Willingness to pay  
for preferred dried  
fruit in conventional,  
organic and fair-  
trade conditions for  
varying consumer  
characteristics

Consumer variable ( $n = 96$ )	WTP conventional (SD)	WTP organic (SD)	WTP fair trade (SD)
<i>Demography</i>			
Gender: female	4.98* (2.11)	8.91*** (2.38)	10.75*** (3.09)
Age*10	-0.57 (0.09)	-1.56 (0.10)	-0.61 (0.13)
Education: higher education	2.39 (2.12)	4.64* (2.44)	3.67 (3.05)
Consumption rate: high	1.04 (2.12)	0.59 (2.43)	2.30 (3.04)
D1-COO-Fair trade	-0.61 (2.85)	0.76 (3.27)	4.94 (4.09)
D2-COO-Experience	-0.37 (2.32)	1.60 (2.66)	1.78 (3.33)
<i>Model details</i>			
Constant	26.19*** (3.32)	32.69*** (3.81)	34.05*** (4.76)
Sigma constant	9.65*** (0.70)	11.07*** (0.81)	13.85*** (1.00)
Log likelihood	-352.88	-364.65	-388.54
Prob > $\chi^2$	0.22	0.004	0.01
LR $\chi$ (6)	8.24	19.05	16.23

**Notes:** Tobit analysis censored at zero. Standard errors are in parentheses. D1-COO-Fair trade and D2-COO-Experience are dummies coded from the open-ended answers on the motivations underpinning the COO preferences. D1-COO-Fair trade: preference for a Country of Origin is motivated by fairness in trade. D2-COO-Experience: preference for a Country of Origin is motivated by personal experience and involvement with respective countries. Significant results \* $p < 0.10$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.001$

for organic than women, and this was despite women's stronger interest in environmental or ecological products.

Individuals with more education (consumers with a diploma or university education) are also willing to pay more for credence attributes, although the results are only significant for the organic attribute (5 NOK, €0.6). This is probably because highly educated consumers are more aware of healthiness, show more environmental concern and at the same time benefit from higher purchasing power (Baiardi *et al.*, 2012). These results are in line with the literature on WTP for organic produce, where educated consumers seem to care more for organic than the less educated (Smith *et al.*, 2009).

### Consumer groups

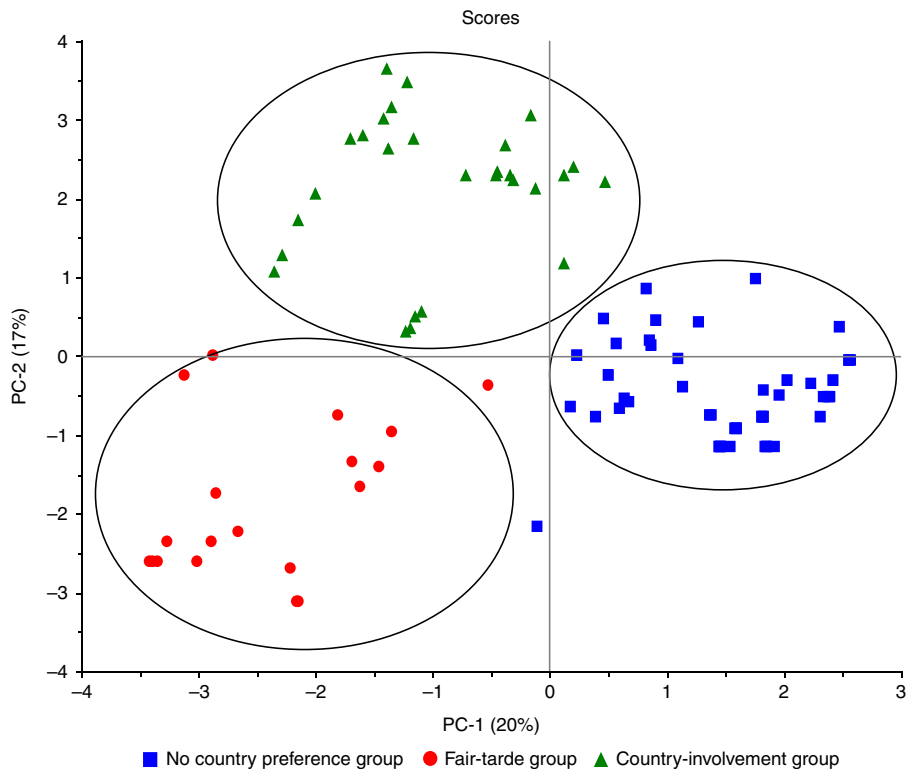
A PCA and an agglomerative hierarchical cluster analysis with a complete linkage method [3] were run to uncover patterns between consumer characteristics, attitudes and WTP premiums. The cluster analysis results are separated into three-consumer groups: a fair-trade group (19.8 per cent), a country-involvement group (29.2 per cent) and a consumer group indifferent to COO (51 per cent) (see Table III). These groups are highlighted on the PCA score plot presented in Figure 4. PC1 (20 per cent explained variance) separates consumers indifferent to COO from consumers with a preferred COO (Figure 5). Within the present consumer sample, men chose a specific COO more frequently than women (Figure 5 and Table III). Further, highly educated consumers were more likely to be found in the fair-trade and country-involvement groups (Table III) than lower educated consumers. PC2 (17 per cent explained variance) splits consumers evoking fair trade (fair-trade group) from those evoking previous involvement or experience as a reason for their preferred COO (country-involvement group). Consumers who selected Black African countries (such as Tanzania and Uganda) did so for fairness in trade. They were also more likely to be experienced dried fruit customers, and they tended to show a higher WTP for

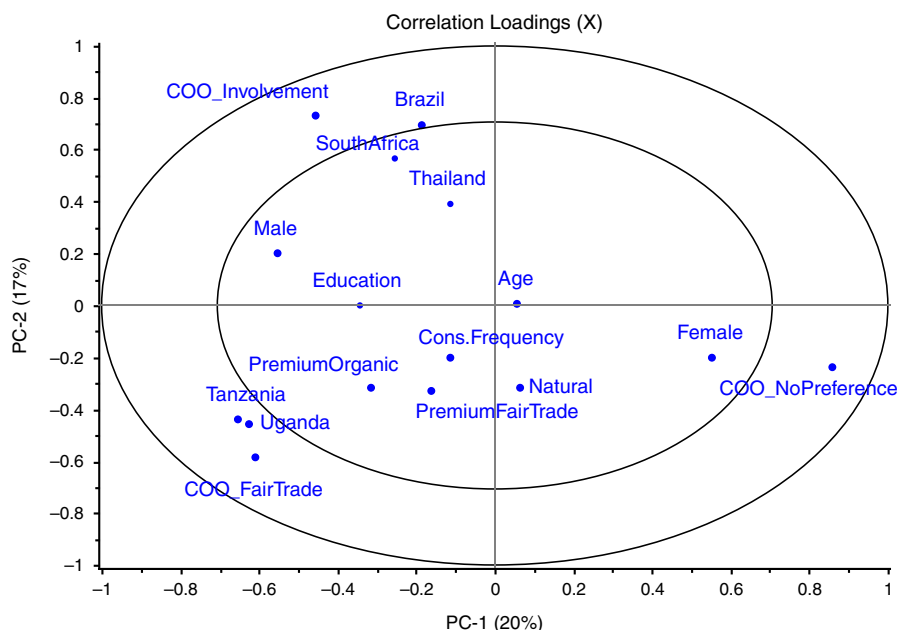
**Table III.**  
Mean characteristics  
of the three-  
consumer groups  
from the cluster  
analysis

Variables (mean)	Fair trade ( $n = 19$ )	Country involvement ( $n = 28$ )	No preference ( $n = 49$ )
Age	30 (21-59)	27 (19-58)	29 (18-64)
Gender (1 = female)	0.32	0.46	0.78
Education (1 = educated)	0.79	0.75	0.53
Consumption (1 = frequent)	0.79	0.57	0.61
<i>Preferred attributes</i>			
Organic (1 = organic)	0.84	0.54	0.49
Fair trade (1 = fair trade)	0.95	0.68	0.76
<i>Preferred COO</i>			
Tanzania	0.84	0.21	0.10
Uganda	0.79	0.10	0.04
South Africa	0.11	0.68	0.08
Brazil	0.05	0.71	0.06
Thailand	0	0.25	0

**Notes:** A multivariate test (mvtest) was run to compare the difference between the three clusters for all the variables except COO, revealing that the groups are significantly different at a 5 per cent level (Lawley-Hotelling  $p = 0.0347$ ; when allowing for heterogeneity between the groups  $p = 0.0021$ )

**Figure 4.**  
A visualization of  
the clusters for the  
first two components  
of the PCA scores.  
Three-consumer  
clusters are defined  
based on consumers'  
stated reasons for  
preferring dried  
fruits from a specific  
country





**Note:** “Premium” indicates the price premium for fair trade and organic compared to conventional products

**Figure 5.**  
Correlation loadings  
from a PCA on  
consumer  
characteristics and  
attitudes

fair trade and organic products than the other two consumer groups did (Figure 5 and Table III). Consumers who selected other countries producing exotic-dried fruits (such as Brazil, South Africa or – to some extent – Thailand) often did so because of previous involvement or experience with these countries (Figure 5 and Table III).

### Conclusions and recommendations

This study aimed to provide a better understanding of European consumer preferences for African dried fruits. To achieve this, a study was conducted on a sample of 96 Norwegian participants mostly representing younger consumers (mean age 28.7 years) of higher education (64.6 per cent with university education).

We first identified sensory attributes driving consumer preferences for dried fruits, then we estimated consumer WTP for conventional, organic and fair-trade dried fruits. Finally, we identified consumer groups based on their interest in specific COO, attitudes towards COO preferences, consumer characteristics and WTP premiums. From our analysis the following conclusions were reached.

Consumers preferred dried mangoes and pineapples. Moreover, preferences for a fruit were mainly driven by strong fruit aroma, sweetness or acidic intensity. On the contrary, lack of aroma, extreme hardness and low sweetness combined with high acidity were sensory properties that were rejected the most by consumers. Therefore, to be able to capture consumer preferences, dried fruit producers should concentrate on better selection of fruit varieties that fulfil the desired characteristics, such as ripe mango Dodo. Fruits with different flavours may also be labelled with descriptive sensory attributes because consumers who prefer sweet flavours differ from those preferring strong, acidic flavours or sweet and sour flavours.

---

Despite consumers' preference for naturalness over uniform taste, we recommend that producers should strive to deliver products of preferred and uniform sensory quality attributes by selecting the appropriate raw material qualities that meet a desired taste. This calls for the development of strict grades and standards for raw materials.

Furthermore, consumers valued both organic and fair-trade labelled dried fruits, but were willing to pay a higher premium for fair-trade dried fruits than for organic-dried fruits. The study divides consumers into three segments. The first is the country-involvement group, which values a specific COO because of previous knowledge about the country. The second consumer segment includes those who care about fair trade and supporting low-income farmers, thus showing altruistic characteristics. The third segment includes consumers with no preference for a particular COO, but who may have preference for fair-trade products.

Therefore, to be able to target the different consumer segments, we recommend a combination of fair trade, organic and naturalness labels together with labels describing the sensory characteristics, as a marketing strategy for selling dried fruit snacks. Based on our data, these credence attributes create more added value than does information on COO from different developing countries.

This study concentrated on dried fruits as snacks to be eaten directly from a packet, though there are different ways that dried fruits can be used in food preparation. For example, they can be used in fruit/vegetable/potato salads, breakfast cereals and as ingredients in baking. In these food preparations, negative attributes such as "too hard", or "too sour/acidic" might be considered to be positive attributes. Therefore, we recommend consumer studies on the use of dried fruits with different sensory attributes in various food preparations, and studies exploring the relative price premiums for organic and fair trade under these different usage purposes and in different package sizes.

### **Acknowledgements**

The authors are grateful for the financial support from the Norwegian Agency for Development Cooperation (NORAD) through the NUFU project: "Empowering women to participate in higher level of fruits and vegetables value chain through production of dried fruits". The authors specifically thank the project leader Professor Trude Wicklund, for her cooperation for the entire research process in this work. The authors also thank Siv Berit Lundberg and Kathrine Strøm for their help in collecting the data; and professor Frode Alfnes for his comments and suggestions in helping shape this paper.

### **Notes**

1. Although untrained assessors are more and more frequently used in descriptive sensory analysis of food products, often because of economical and convenience aspects, several methods adapted to untrained subjects have been developed and may be adopted in future experiments (Varela and Ares, 2014).
2. This category of consumer is willing to forgo a guaranteed or stable taste for a natural product.
3. PCA scores from the first five components were used. Five components give a reasonable amount of explained variance (61 per cent); although the first two components reconstitute the main structured patterns (37 per cent explained variance).

---

## References

- Aarset, B., Beckmann, S., Bigne, E., Beveridge, M., Bjorndal, T., Bunting, J., McDonagh, P., Mariojouis, C., Muir, J. and Prothero, A. (2004), "The european consumers' understanding and perceptions of the 'organic' food regime: the case of aquaculture", *British Food Journal*, Vol. 106 No. 2, pp. 93-105.
- Agona, J., Nabawanuka, J. and Kalunda, P. (2002), "A market overview of the dried fruit sector in Uganda", *ADC Commercialization Bulletin (8)*, available at: [www.foodnet.cgiar.org/Projects/Dried\\_Fruits\\_Ug.pdf](http://www.foodnet.cgiar.org/Projects/Dried_Fruits_Ug.pdf) (accessed 15 March 2014).
- Alfnes, F. (2004), "Stated preferences for imported and hormone-treated beef: application of a mixed logit model", *European Review of Agricultural Economics*, Vol. 31 No. 1, pp. 19-37.
- Alphonse, R. and Alfnes, F. (2012), "Consumer willingness to pay for food safety in Tanzania: an incentive-aligned conjoint analysis", *International Journal of Consumer Studies*, Vol 36 No. 4, pp. 394-400.
- Baiardi, D., Puglisi, R. and Scabrosetti, S. (2012), *Individual Attitudes on Food Quality and Safety: Empirical Evidence on EU Countries*, Department of Economics and Management, University of Pavia, Pavia.
- Cailleba, P. and Casteran, H. (2011), "A quantitative study on the fair trade coffee consumer", *Journal of Applied Business Research*, Vol. 25 No. 6, pp. 31-46.
- Centre for the Promotion of Imports from Developing Countries (CBI), Ministry of Foreign Affairs of the Netherlands (2014), "Promising EU export markets for dried mangoes", CBI Market Information Database, Compiled by searce, available at: [www.cbi.eu/disclaimer](http://www.cbi.eu/disclaimer) (accessed 12 January 2015).
- Chattopadhyay, R. and Duflo, E. (2004), "Women as policy makers: evidence from a randomized policy experiment in India", *Econometrica*, Vol. 72 No. 5, pp. 1409-1443.
- Constanigro, M., Kroll, S., McFadden, D.T. and Nurse, G. (2010), "Local and organic: substitutes or complements? An in-store evaluation of labels for apples", paper presented at the Agricultural and Applied Economics Association 2010 AAEA, CAES, and WAEA Joint Annual Meeting, 25-27 July, Denver, CO, available at: <http://ageconsearch.umn.edu/bitstream/61537/2/Marco-Final.pdf> (accessed 12 January 2015).
- Darby, M.R. and Karni, E. (1973), "Free competition and the optimal amount of fraud", *Journal of Law and Economics*, Vol. 16 No. 1, pp. 67-88.
- De Pelsmacker, P., Driesen, L. and Rayp, G. (2005), "Do consumers care about ethics? Willingness to pay for fair-trade coffee", *Journal of Consumer Affairs*, Vol. 39 No. 2, pp. 363-385.
- Didier, T. and Lucie, S. (2008), "Measuring consumer's willingness to pay for organic and fair trade products", *International Journal of Consumer Studies*, Vol. 32 No. 5, pp. 479-490.
- European Commission DGVI (1997), "The common agricultural policy: attitudes of EU consumers to fairtrade bananas", Directorate-General for Agriculture, Brussels, available at: [http://ec.europa.eu.int/comm/public\\_opinion/archives/ebs/ebs\\_116\\_en.pdf](http://ec.europa.eu.int/comm/public_opinion/archives/ebs/ebs_116_en.pdf) (accessed 16 December 2013).
- Fairtrade International (2012), "Fairtrade by the numbers key data for (2009-2011)", Fairtrade Labelling Organizations International, e.V., available at: [www.fairtrade.net/fileadmin/user\\_upload/content/2009/resources/2012-02\\_Fairtrade\\_ByTheNumbers\\_2009-11.pdf](http://www.fairtrade.net/fileadmin/user_upload/content/2009/resources/2012-02_Fairtrade_ByTheNumbers_2009-11.pdf) (accessed 1 July 2014).
- Giannakas, K. (2002), "Information asymmetries and consumption decisions in organic food product markets", *Canadian Journal of Agricultural Economics*, Vol. 50 No. 1, pp. 35-50.
- Grunert, K.G. (2005), "Food quality and safety: consumer perception and demand", *European Review of Agricultural Economics*, Vol. 32 No. 3, pp. 369-391.
- Guilabert, M. and Wood, J.A. (2012), "USDA certification of food as organic: an investigation of consumer beliefs about the health benefits of organic food", *Journal of Food Products Marketing*, Vol. 18 No. 5, pp. 353-368.

- Harper, G. and Henson, S. (2001), "Consumer concerns about animal welfare and the impact on food choice", EU FAIR CT98-3678 final report, Centre for Food Economics Research (CeFER), The University of Reading, Reading, Berkshire, p. 38, available at: [http://ec.europa.eu/food/animal/welfare/eu\\_fair\\_project\\_en.pdf](http://ec.europa.eu/food/animal/welfare/eu_fair_project_en.pdf) (accessed 20 January 2014).
- Huet, N. (2013), "Fairtrade sales to grow as consumers demand better labelling", Reuters, 28 February, available at: <http://uk.reuters.com/article/2013/02/28/uk-fairtrade-sales-interview-idUKBRE91R0XT20130228> (accessed 10 July 2014).
- Hughner, R.S., McDonagh, P., Prothero, A., Shultz, C.J. and Stanton, J. (2007), "Who are organic food consumers? A compilation and review of why people purchase organic food", *Journal of Consumer Behaviour*, Vol. 6 Nos 2-3, pp. 94-110.
- Hutchins, R. and Greenhalgh, L. (1995), "Organic confusion: sustaining competitive advantage", *Nutrition and Food Science*, Vol. 95 No. 6, pp. 11-14.
- Illichmann, R. and Abdulai, A. (2013), "Analysis of consumer preferences and willingness to pay for organic food products in Germany", paper presented at the Agricultural and Applied Economics Association's 2013 AAEA and CAES Joint Annual Meeting, Washington, DC, 4-6 August, available at: [http://ageconsearch.umn.edu/bitstream/150980/2/Illichmann\\_Abdulai\\_AAEA%202013.pdf](http://ageconsearch.umn.edu/bitstream/150980/2/Illichmann_Abdulai_AAEA%202013.pdf) (accessed 1 July 2014).
- Jesionkowska, K., Sijtsema, S., Konopacka, D. and Symoneaux, R. (2009), "Dried fruit and its functional properties from a consumer's point of view", *The Journal of Horticultural Science and Biotechnology*, ISAFRUIT Special Issue, Vol. 84 No. 6, pp. 85-88.
- Jesionkowska, K., Sijtsema, S., Simoneaux, R., Konopacka, D. and Plocharski, W. (2008), "Preferences and consumption of dried fruit and dried fruit products among Dutch, French and Polish consumers", *Journal of Fruit and Ornamental Plant Research*, Vol. 16, pp. 261-274.
- Juric, B. and Worsley, A. (1998), "Consumers' attitudes towards imported food products", *Food Quality and Preference*, Vol. 9 No. 6, pp. 431-441.
- Kvakkestad, V., Refsgaard, K. and Berglann, H. (2011), "Citizen and consumer attitudes to food and food production in Norway", paper presented at the 9th International Conference of the European Society for Ecological Economics, Boğaziçi University, Istanbul, 14-17 June.
- List, J.A. and Gallet, C.A. (2001), "What experimental protocol influence disparities between actual and hypothetical stated values?", *Environmental and Resource Economics*, Vol. 20 No. 3, pp. 241-254.
- Loureiro, M.L. and Lotade, J. (2005), "Do fair trade and eco-labels in coffee wake up the consumer conscience?", *Ecological Economics*, Vol. 53 No. 1, pp. 129-138.
- Lusk, J. and Shogren, J.F. (2007), *Experimental Auctions: Methods and Applications in Economic and Marketing Research*, Cambridge University Press, New York, NY.
- Lusk, J.L. and Briggeman, B.C. (2009), "Food values", *American Journal of Agricultural Economics*, Vol. 91 No. 1, pp. 184-196.
- McDonagh, P. and Prothero, A. (Eds) (1997), *Green Management: A Reader*, Dryden Press, London.
- Mahé, T. (2010), "Are stated preferences confirmed by purchasing behaviours? The case of fair trade certified bananas in Switzerland", *Journal of Business Ethics*, Vol. 92 No. 2, pp. 301-315.
- Makatouni, A. (2002), "What motivates consumers to buy organic food in the UK?: results from a qualitative study", *British Food Journal*, Vol. 104 Nos 3/4/5, pp. 345-352.
- Menapace, L., Colson, G., Grebitus, C. and Facendola, M. (2011), "Consumers' preferences for geographical origin labels: evidence from the Canadian olive oil market", *European Review of Agricultural Economics*, Vol. 38 No. 2, pp. 193-212.

- 
- Næs, T., Brockhoff, P.B. and Tomic, O. (2010), *Front Matter*, in *Statistics for Sensory and Consumer Science*, John Wiley and Sons Ltd, Chichester.
- Nelson, P. (1974), "Advertising as information", *The Journal of Political Economy*, Vol. 82 No. 2, pp. 729-754.
- O'Donovan, P. and McCarthy, M. (2002), "Irish consumer preference for organic meat", *British Food Journal*, Vol. 104 Nos 3/4/5, pp. 353-370.
- Olesen, I., Alfnes, F., Røra, M.B. and Kolstad, K. (2010), "Eliciting consumers' willingness to pay for organic and welfare-labelled salmon in a non-hypothetical choice experiment", *Livestock Science*, Vol. 127 Nos 2-3, pp. 218-226.
- Olson, J.C. (1977), "Price as an information cue: effects in product evaluation", in Woodside, A.G., Sheth, J.N. and Bennet, P.D. (Ed.), *Consumer and Industrial Buying Behaviour*, North-Holland Publishing Company, New York, NY, pp. 267-286.
- Olson, J.C. and Jacoby, J. (1972), "Cue utilisation in the quality perception process", in Venkatesan, M. (Ed.), *Proceeding of the Third Annual Conference of the Association for Consumer Research*, Association for Consumer Research, Iowa City, IA, pp. 167-179.
- Poelman, A., Mojet, J., Lyon, D. and Sefa-Dedeh, S. (2008), "The influence of information about organic production and fair trade on preferences for and perception of pineapple", *Food Quality and Preference*, Vol. 19 No. 1, pp. 114-121.
- Rijswijk, W.V., Frewer, L.J., Menozzi, D. and Faioli, G. (2008), "Consumer perceptions of traceability: a cross-national comparison of the associated benefits", *Food Quality and Preference*, Vol. 19 No. 5, pp. 452-464.
- Rotaris, L. and Danielis, R. (2011), "Willingness to pay for fair trade coffee: a conjoint analysis experiment with Italian consumers", *Journal of Agricultural and Food Industrial Organization*, Vol. 9 No. 1, doi: 10.2202/1542-0485.1305.
- Schifferstein, H.N. and Ophuis, P.A.O. (1998), "Health-related determinants of organic food consumption in the Netherlands", *Food quality and Preference*, Vol. 9 No. 3, pp. 119-133.
- Schjøll, A. (2014), "Consumer preference for animal welfare: what can we learn from restaurant, store and web experiments?", PhD Thesis No. 2014:60, School of Economics and Business, Norwegian University of Life Sciences, Ås, Norway.
- Shepherd, R., Magnusson, M. and Sjöden, P.O. (2005), "Determinants of consumer behavior related to organic foods", *A Journal of the Human Environment*, Vol. 34 No. 4, pp. 352-359.
- Smith, T.A., Huang, C.L. and Lin, B.H. (2009), "Does price or income affect organic choice? Analysis of US fresh produce users", *Journal of Agricultural and Applied Economics*, Vol. 41 No. 3, pp. 731-744.
- Torjusen, H., Lieblein, G., Wandel, M. and Francis, C.A. (2001), "Food system orientation and quality perception among consumers and producers of organic food in Hedmark county, Norway", *Food Quality and Preference*, Vol. 12 No. 3, pp. 207-216.
- Varela, P. and Ares, G. (Eds) (2014), *Novel Techniques in Sensory Characterization and Consumer Profiling*, CRC Press, New York, NY.
- Wandel, M. and Bugge, A. (1997), "Environmental concern in consumer evaluation of food quality", *Food Quality and Preference*, Vol. 8 No. 1, pp. 19-26.
- Worch, T., Lê, S. and Punter, P. (2010), "How reliable are the consumers? Comparison of sensory profiles from consumers and experts", *Food Quality and Preference*, Vol. 21 No. 3, pp. 309-318.
- Yang, S.H., Hu, W., Mupandawana, M. and Liu, Y. (2012), "Consumer willingness to pay for fair trade coffee: a Chinese case study", *Journal of Agricultural and Applied Economics*, Vol. 44 No. 1, pp. 21-24.



Yiridoe, E.K., Bonti-Ankomah, S. and Martin, R.C. (2005), "Comparison of consumer perceptions and preference toward organic versus conventionally produced foods: a review and update of the literature", *Renewable Agriculture and Food Systems*, Vol. 20 No. 4, pp. 193-205.

Yue, C., Grebitus, C., Bruhn, M. and Jensen, H.H. (2010), "Marketing organic and conventional potatoes in Germany", *Journal of International Food and Agribusiness Marketing*, Vol. 22 Nos 1-2, pp. 164-178.

#### **About the authors**

Dr Roselyne Alphonse holds a PhD from the Norwegian University of Life Sciences in Norway; and is a Lecturer at the Sokoine University of Agriculture in Tanzania. She specializes in consumer behaviour and experimental economics studies, with special interest in food quality and non-market valuation. Dr Roselyne Alphonse is the corresponding author and can be contacted at: [roselynealphonce@yahoo.com](mailto:roselynealphonce@yahoo.com)

Dr Anna Temu is a Senior Lecturer at the Sokoine University of Agriculture, she specializes in agribusiness and agricultural value chain development, with special interest in value chain upgrading.

Dr Valérie Lengard Almli is a Research Scientist at the Food Research Institute (Nofima) in Norway. Her main areas of research are consumer behaviour and sensory science with special interest in experimental design and multivariate data analysis.