

## Insects as Food and Feed in The Turkey: Current Behaviours

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**Abstract:** Insects which have begun to be seen as the main food source, are becoming increasingly popular in food and nutrition. When we look at foreign studies of insects research within a decade, those concerning edibility seem to have increased in the last three years. This study provides an overview on the perception and acceptance by consumers of insects as an alternative food source in Turkey and comprises a social experiment. For this purpose, the study was carried out on a total of 100 people attending "Nutrition Education" and "New Trends in World Cuisine", and pre- and post-training behaviours were observed. It understood that the majority of the individuals participating in the study did not see insects as a food source and would have been consumed if they were religiously appropriate. Despite the work being done, the question remains unanswered as to whether or not edible insects will have the potential to gain a position in the Turkish cuisine in the coming years.

**Keywords:** Alternative Food, Edible Insects, Consumer Behaviours, Turkey

### INTRODUCTION

The human being who has been seen as a consumer since the early ages of human history; are known to be affected by the lifestyles of the eating habits (such as nomadic and sedentary life), the settlement area, and the civilizations with which they interact<sup>[1,2]</sup>. Nutritional status can also be shaped by the behaviour of the consumer. For example; starting from personal characteristics, the ability to buy goods and services from the economic point of view, the ability to access services, and knowing what you want (consumer awareness). In addition, the process of individual decisions about which goods and services to buy, how, where, when, and when to buy or not is affected by this behaviour;<sup>[3]</sup> Consumer behaviour is a broad concept;<sup>[4]</sup> that consumers cannot be precisely explained why they buy or do not buy a product. The perception system that affects consumer behaviour is; many stimulants coming to people's sensory organs are simply ignoring other stimulants by concentrating on any situation and object<sup>[5]</sup>. Thus, the diversity of consumer behaviours regarding nutrient uptake;

- Demographic Characteristics (age, gender, education, income level etc.)
- Geographic Features
- Physiological status (growth, development, pregnancy and breastfeeding status, etc.)
- Psychological Condition
- Health Status (drug use, genetic disease, etc.)
- Faith Status (Morality, sect, tradition)
- Sensory properties (pleasure, taste, smell)
- Perception (media, advertising, internet, etc.) it is based on factors<sup>[5]</sup>.

It is expressed that personal values such as tradition and religious beliefs play an important role in shaping consumer behaviours by researchers<sup>[6]</sup>. However, it can be said that the psychological factors considered as experienced / unexperienced experienced to decrease or the increase of consumption in nutrition are also important. Because the possible fears of a good or bad experience about a food are reflected in the person's nutritional preference for rejecting the food<sup>[7, 8]</sup>. The qualities of the food such as what is the food, how to prepare and cook, the appearance of the food, the consistency, the warmth, the colour, the smell and the most important taste etc. reveal the quality of the food and the effect (positive or negative) on the individual's food preferences<sup>[9]</sup>. In a study conducted, it was found that as income increases, people eat less bread<sup>[10]</sup>. In other words, the economic situation of families and institutions also affects their consumption habits. Accordingly, personal demographic characteristics and sensory pleasure (sensory memory) are of great importance in the selection of food, in the emergence of nutrition habits of the individual. It is known that eating habits begin in the womb and

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fetuses are known to have learned habits here <sup>[11]</sup>. If the basic food items are not taken more than once, various diseases are seen in the individuals and it is necessary to create a menu depending on the necessity of nutrition <sup>[12]</sup>. Although the transportation and consumption of food to the food items is due to the food source, the geographical variety in which the person is living varies in the choice of food. One who wants to consume protein in our country can supply this need sheep's in Central Anatolia, cattle breeding in Eastern Anatolia, seafood and legumes in the Mediterranean, and insects in countries like Asia-Africa <sup>[5, 13]</sup>. Insect consumption, not in Turkey; it has long been used as one of the main foodstuffs in Asia, Africa, Latin America and even Australia. Insects are the reason for the growing world population to be discussed as a new / alternative source of protein that has a potential for ecological (positive) and economic value compared to the need for nutrition and traditional animal breeding. Every country and every nation that has different gastronomic cultural heritages around the world is diversified in terms of approaches to new food products, acceptance rates, culture. For example, in tropical regions while the defeat of insect species nearly two thousand, Luxembourg and Turkey was also in shows uncertainty about the insect consumption in certain countries <sup>[14, 15]</sup>. Numerous insect species appear to be culturally important as nutrient values that are both harmful, disgusting and frightening for some societies in the history of humankind, while attracting interest for others (egg, honey, pollen, silk), as well as forensic cases and laboratory use as model organisms <sup>[16]</sup>. Insects can be used as food additives in the arts (literary, novel, poetry, film, games, music, handicrafts), dreams, history, religion, public health as well as small and large cattle breeding and fish meal production as a result of their work <sup>[17, 18]</sup>. From the perspective of Turkish culinary culture, there is no other study about the renewability of insects until now. In order to be able to be determined in social experiments; the performances of the individuals and the performances of the control group should be compared without any intervention before and after the pre-training situations, the obtained data should be evaluated in the desired behaviour, the positive expectations are evaluated as negative, and the external behaviours are evaluated as negative <sup>[19, 20, 21, 22]</sup>. Targeted behavioural development is determined by comparing the success of the application with control and experimental groups <sup>[21, 22, 23]</sup>. Insects in Turkey generally harmful and frightening as by: insect proteins in many countries, carbohydrates, trace elements, thanks to amino acids and minerals in terms of nutritional value of high and low-fat occurs has led them to be seen among food deemed appropriate in terms of health.

This study attempts to address the possible position of edible insects as an old nutrient and new / alternative food in many international studies. Turkey in insects by providing an overview of the available data on food as perceived from the perspective of the consumer and acceptance comprises a social experiment. It is being debated whether the "feeding with insects", which is starting to be seen as new / alternative food, cannot be used with various perception systems in our country.

## **MATERIALS AND METHODS**

Konya Necmettin Erbakan University Gastronomy Culinary Arts undergraduate and graduate students were selected as research universes. The study group consisted of approximately 14 weeks (average 40-45 for each presentation) of "Edible Insects as Alternative Food Source" between January and June 2017, randomly selected from students with nutritional awareness of alternative foods and processing systems, was performed. The responses given before and after the training were recorded <sup>[22]</sup>. The study was conducted on edible insects in the context of new food products identified by Siegrist <sup>[24]</sup>. The choice of edible insects as food affects a variety of factors, including cultural, social, environmental and religious responsibility, obstacles, one's own risk behaviour, and anxieties. The study presents a framework that captures the evaluation process for acceptance (positive behaviour / usability) or refusal (negative behaviour / unusable thought) of young consumers when new food products are introduced to the market. Because the exhibited behaviour is not a similar study and social experiment on insects; The observation form which was developed <sup>[25]</sup> and its validity is 88% was arranged according to the training, positive (perspective to be attained) and negative (external behaviours to be attained) behaviours. Frequency is taken into consideration in data analysis. Thus, the attitudes of the individuals in our country on the consumer perception of edible beetle availability are evaluated.

**RESULTS**

In the study, Konya Necmettin Erbakan University observed the behaviours of second year and undergraduate students who are thought to be aware of the insects by taking the fall semester "New Trends in the World Cuisine" undergraduate students of Gastronomy Culinary Arts. What people consume insects as food in Turkey, and so they are willing to volunteer, and aimed to reveal the factors that affect this situation.

According to the sample size of the universe <sup>[26]</sup>, the expected and observed students are seen in Table1. Students who come to class regularly and agree to participate in the work are included.

**Table 1.** Students taking the "New Trends in International Cuisine" course

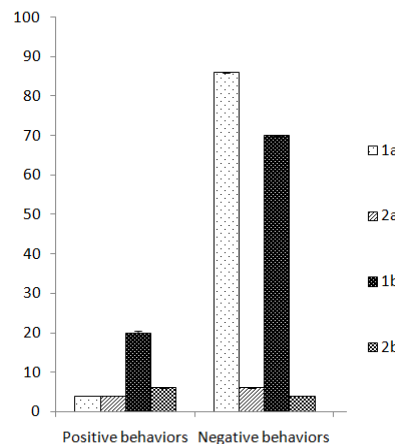
	Education Period	Hoped	Present
Undergraduate	First Branch	61	56
	Second Branch	36	34
Graduate	First Branch	10	10
	Totally	107	100

Demographic characteristics are shown in Table 2, with the vast majority of students being undergraduates (90%) with an average age of 18 to 25 years. 52% of the respondents were male and were found to be mostly single.

**Table 2.** Demographic characteristics of students

Demographic	Age	Undergraduate	Graduate	Totally
Period	First Branch	56	10	<b>100</b>
	Second Branch	34		
Age	≤17	1	-	<b>1</b>
	18-25	85	9	<b>94</b>
	≥26	4	1	<b>5</b>
Gender	Female	43	5	<b>48</b>
	Male	47	5	<b>52</b>
Marital Status	Married	5	-	<b>5</b>
	Single	85	10	<b>95</b>

In this study, which is regarded as an alternative food, it is thought that this study will be beneficial in determining the edibility of insects in our country and revealing what has been paid attention to renewable foods. Individuals participating in the study did not see insects as food source before training (92%) and after education they showed negative behaviour by falling to 74%; it was found that the positive behaviours that the students could prefer beetles were 8% before training and 26% after training (Figure 1).



**Figure 1.** Edible insect behaviour of students before and after training (1. graduate, 2. showing graduate students; a. behaviours performed in the pre-training period, b. post-training behaviours)

The positive behaviour of the participants is low, because the effect of the religious opinion factor is high.

## **DISCUSSION AND CONCLUSION**

Despite the fact that there are many studies on consumer's eating habits and attitudes and behaviours related to food preferences, Turkish culinary culture, new food cultures and practicing knowledge [27, 28, 29, 30,31, 32, 33, 34] there is no study about possible consumer behaviours for feeding with insects and country. Agricultural areas, geographical food sources, safe food transportation concerns due to global warming and environmental factors increase the tendency of people to alternative foods and products. With this anxiety, people are seeing to new trends such as artificial meat and 3D technologies, edible flowers, insect feeding, waste-free kitchens, no from plate nutrition from the capsule [18].

In a study of five 5 insect species found to have a higher nutritional value than other insects [35]; It has been reported that the protein content of insects is higher than that of the most widely accepted animal meat (cattle and pig) in the world, and the amount of fat is small and healthy compared to other meats. In a survey in Thailand, participants said they did not know that their feeder value despite insects feeding was high (83. 9%) [36]. In our study, it was determined that the amount of protein of the insects was high during the training and that the participants in the usability of the food shortage had positive behaviours.

In studies of nutritional behaviour, it is desirable that participants under age 18 be under 18 years of age (99%) as if we were working for [37] that they would not be able to express nutritional habits and continue the nutritional recovery period. In the same study, the average age of individuals who consume insects in Kenya (234 individuals), known to consume insects in Africa, is 41. 88% of these participants say they have consumed some edible insect species [37]. In this group, it is stated that insects are seen as an alternative food source against meat, and that their preference for possible risk factors affect their behaviour in food selection. Religion affects consumer behaviour with being an important source of motivation [38]. Increasing awareness of the Muslim population in the world has increased the prejudice given to halal food by affecting their behaviour [18]. In this case, consumers with Islamic beliefs do not consume edible insects and their products. Contrary to the work [37] it is seen in our country that one of the important factors that affect / restrict the nutritional behaviours of the consumers is not the possible risks but the belief situation. In terms of insects, it is stated that other insects except grasshoppers are not suitable for Islamic belief [16, 18]. It was determined that the increase in positive behaviour as a result of the trainings was 30.7% due to religious beliefs.

In Western countries, insects are not included in the nutrition culture, climate conditions are predisposed to agriculture and animal husbandry, welfare level and belief. For example, it has increased its acceptability as a new trend to be seen as a factor that prevents the wasteful consumption of "waste-free kitchens" [39, 40]. According to these results, it is seen that the majority of the participants are influenced by their beliefs that they do not accept edible insects as food and can be used as an alternative. The edible insect trend can be seen as an alternative to basic food and meat by consumers in different geographical regions but for our country, more detailed studies are needed when measuring the situation and attitude.

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