

Supplementary Material

Table S1: Survey items used in the present study

First section	
1) In which province of Ireland do you reside?	Connaught
	Leinster
	Munster
	Ulster
2) In which province of Ireland do you work?	Connaught
	Leinster
	Munster
	Ulster
3) Which gender best describes you?	Female
	Male
	Other
	Prefer not to say
4) How old are you?	18-29
	30-39
	40-49
	50-59
	60 and above
5) What is your level of education?	No formal education
	Junior certificate
	Advanced certificate/green certificate
	Ordinary Bachelor' degree
	Honours Bachelor' degree
	Postgraduate (Master's or PhD)
6) Are you aware that insects can be used in animal feed?	Yes
	No
7) Do you follow a specific diet (vegan, vegetarian, calorie-restricted, or other)?	Yes
	No
7.1) Can you please specify below the type of diet that you follow: <i>Question displayed only if 'Yes' is selected for Q7</i>	[Open-ended]
Second section	
8) Please state how willing you would be to eat the following meat/animal-based products if the animals were fed insect-based feed: Chicken Beef Pork Fish Lamb/mutton Eggs Dairy	Extremely unwilling
	Somewhat unwilling
	Neither willing nor unwilling
	Somewhat willing
	Extremely willing
9) Please state to what extent you would agree with the following statements: "I am willing to eat food products derived from	Strongly disagree

<p>animals that have been fed with insect-based feed... ...if the food products are cheaper." ...if the information is specified on the food product packaging." ...if insects are naturally part of the animals' diet." ...if feeding animals with insect-based feed has a positive impact on the environment." ...if the price of the food products is comparable to the existing food products in the market."</p>	Somewhat disagree
	Neither agree nor disagree
	Somewhat agree
	Strongly agree
10) If you have any other reasons for which you would be willing to eat food products derived from animals that have been fed with insect-based feed, please state them below:	[Open-ended]
<p>11) Please state to what extent you would agree with the following statements: "I am NOT willing to eat food products derived from animals that have been fed with insect-based feed... ...if the food products are more expensive." ...because I am concerned about the sensory appeal (i.e., taste, aroma & texture) of the food product." ...because I am concerned whether I might have allergic reactions after eating these food products." ...because I am concerned about the safety of the food products."</p>	Strongly disagree
	Somewhat disagree
	Neither agree nor disagree
	Somewhat agree
	Strongly agree
12) If you have any other reasons for which you would NOT be willing to eat food products derived from animals that have been fed with insect-based feed, please state them below:	[Open-ended]
13) Do you participate in farming activities related to poultry, fish and/or livestock production?	Yes
	No
Third Section	
14) In what type of farming activities are you involved? Select all that apply	Beef
	Dairy
	Pigs
	Poultry
	Sheep, goat and other grazing livestock
	Fish
	Specialist tillage
	Mixed crops and livestock
	Other (specify)
15) Please state the size of your farm in hectares (Ha). In brackets is the hectare amount converted to acres (Ac)	0-10Ha (0-25Ac)
	11-20Ha (26-49Ac)
	21-30Ha (50-74Ac)
	31-50Ha (75-124Ac)
	51-100Ha (125-247Ac)
	More than 100Ha (247Ac)
	I am not sure
	Not applicable
	Prefer not to say
16) How many animals do you have on your farm?	0-50
	51-100
	101-500
	501-1000
	More than 1000

	I am not sure
	Not applicable
	Prefer not to say
17) What type of feed ingredients do you currently use for your animals? Select all that apply	Cereals including maize, wheat and rice
	Soymeal
	Grass
	Silage
	Rapeseed meal
	Sunflower seeds
	Palm kernel
	Molasses
	Brewer's/distiller's grain
	Other (specify)
18) Have you ever used insect-based feed for your animals?	Yes
	No
19) Please state how likely you are to use insect-based feed for your animals?	Extremely unlikely
	Somewhat unlikely
	Neither likely nor unlikely
	Somewhat likely
	Extremely likely
20) Please state to what extent you would agree with the use of insect-based feed for: Fish Poultry Pigs Cattle Sheep Pets	Strongly disagree
	Somewhat disagree
	Neither agree nor disagree
	Somewhat agree
	Strongly agree
21) Please state to what extent you would agree with the following statements: "I am willing to use insect-based feed for my animals... ...if it is safe for animal consumption." ...if consumers will purchase animal products fed with insects." ...if it reduces the price of feed and animal production." ...if the animals will grow faster." ...if the feed is of high nutritional value."	Strongly disagree
	Somewhat disagree
	Neither agree nor disagree
	Somewhat agree
	Strongly agree
22) If you have any other reasons for which you would be willing to use insect-based feed for your animals, please state them below	[Open-ended]
23) Please state to what extent you would agree with the following statements: "I am NOT willing to use insect-based feed for my animals... ...if it introduces microbial contamination or chemical residues to the food chain." ...if it causes allergic reactions in animals or/and humans." ...if it reduces consumer acceptance of food resulting from animal production." ...because I do not have enough information regarding the benefits/risks."	Strongly disagree
	Somewhat disagree
	Neither agree nor disagree
	Somewhat agree
	Strongly agree
24) If you have any other reasons for which you would NOT be willing to use insect-based feed for your animals, please state	[Open-ended]

them below	
<p>25) Legislation: The use of insect protein to manufacture animal feed for pig and poultry has now been authorized by the European Union (regulation can be found here https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L:2021:295:FULL&from=EN)</p> <p>Would there be any other factors you would consider prior to using insect-based feed animal feed?</p>	[Open-ended]
Fourth section	
<p>26) Background: Finally, in relation to using insect-based feed (as per source: https://ipiff.org/wp-content/uploads/2020/02/IPIFF-Nutritional-benefits-of-insects-in-animal-feed.pdf) Insect farms have a reduced environmental footprint-being highly efficient in terms of water footprint and land-use, they are highly efficient in converting lower value by-products into higher-value protein materials, they could improve the feed conversion ratio of farmed animals.</p> <p>Knowing this information, please state how likely you are to: *Use insect-based feed for your animals (<i>displayed only for farmers</i>) *Eat food products derived from animals that have been fed with insect-based feed</p>	Extremely unlikely
	Somewhat unlikely
	Neither likely nor unlikely
	Somewhat likely
	Extremely likely

Table S2: How each main research question of this study was broken down (into embedded research questions) to facilitate survey construction and ensure content validity of the survey.

Main Research Questions	Embedded Questions
Which factors affect the willingness of Irish consumers to consume food products derived from animals that have been fed with insect-based feed?	<p>Which factors related to the characteristics of the consumers (consumer-related factors) affect their willingness to consume foods from animals fed with insect-based feed?</p> <p>Which factors related to the characteristics of the food product or insect-based feed affect the willingness of consumers to consume foods from animals fed with insect-based feed?</p> <p>Does providing information to consumers on the benefits of insect-based feed affect their willingness to consume foods from animals feeding on it?</p>
Which factors affect the willingness of Irish farmers to use insect-based feed for their animals?	<p>Which factors related to the characteristics of the farmers (farmer-related factors) affect their willingness to use insect-based feed?</p> <p>Which factors related to the characteristics of the insect-based feed or final product affect the willingness of farmers to use insect-based feed?</p> <p>Does providing information to farmers on the benefits of insect-based feed affect their willingness to use it?</p>

Table S3: Statistical tests used to analyse the effect of various factors on the willingness of farmers and consumers to accept the use of insect-based feed on animals.

Effect of	On	Statistical test used
Location of residence, location of workplace, age, level of education	Willingness to consume different food products from animals fed with insect-based feed	Kruskal-Wallis
Gender, diet, whether a consumer is involved in farming or not		Mann-Whitney U
Previous knowledge of insects being used in feed		Chi-Square
Reasons for willingness and unwillingness to consume food from animals fed with insect-based feed		Spearman's correlation
Knowing the benefits of insect-based feed		Sign test
Location of residence, location of workplace, age, level of education, size of farm, number of farm animals, level of agreement with use of insect-based feed for different animals	Willingness to use insect-based feed for own animals	Kruskal-Wallis
Type of farming activity, type of feed ingredients currently used	Willingness to use insect-based feed for own animals	Chi-Square
Reasons for willingness and unwillingness to use insect-based feed for own animals		Spearman's correlation
Gender, having used insect-based feed before		Mann-Whitney U
Knowing the benefits of insect-based feed		Sign test

Table S4. An outline of the effect of consumer-related factors (left) on the willingness of participants (N=233) to consume foods (top) derived from animals fed with insect-based feed (IBF).

Willingness to consume food derived from animals fed with IBF								
Factor		Chicken	Beef	Pork	Fish	Lamb/ mutton	Eggs	Dairy
P-values ¹								
Location of residence	of	0.755	0.922	0.950	0.609	0.484	0.932	0.222
Location of workplace	of	0.202	0.142	0.339	0.292	0.153	0.027*	0.027*
Gender		0.410	0.048*	0.027*	0.022*	0.008*	0.710	0.658
Age		0.032*	0.142	0.292	0.958	0.748	0.005*	0.003*
Level of education		0.503	0.308	0.467	0.029*	0.519	0.548	0.363
Previous knowledge of insects being used in feed		0.901	0.940	0.282	0.985	0.627	0.106	0.204
Diet		0.000*	0.000*	0.000*	0.000*	0.000*	0.440	0.682
Whether a consumer is involved in farming or not		0.269	0.199	0.206	0.383	0.305	0.434	0.992

¹p-value significant when *p<0.05

Table S5: The effect of farmer-related factors on their willingness to use insect-based feed

Farmer-related factor	Statistical test used ¹	P-Value ²
Location of residence	Kruskal-Wallis	0.639
Location of workplace		0.439
Age		0.184
Level of education		0.207
Farm size		0.565
Number of animals being reared		0.449
Gender	Mann-Whitney U	0.477
Previous experience with using insect-based feed		0.322
Previous knowledge of insects being used in animal feed		0.322
Type of farming engaged in	Chi-Square	0.186
Type of feed ingredients currently used		0.062
¹ Statistical test used to analyse the effect of the farmer related factor on the willingness to use insect-based feed		
² P-value significant when p<0.05		

Table S6: Themes, sub-themes and corresponding quote examples generated from the qualitative analysis of the data from the open-ended questions

Research question	Themes	Sub-themes	Example quote
Which factors affect the willingness of Irish consumers to consume food products derived from animals that have been fed with IBF?	Consumer-related factors	Diet	"I don't eat beef, pork, lamb or fish - hence my reply to those. It is not the objection to the insect feed." (C18)
	Product-related factors	Safety-concern	"I worry about forcing animals to eat an unnatural diet that may cause problems for that animal and may once again cause problems to humans as it did with the Bovine spongiform encephalopathy (BSE) in cows..." (C19)
		Sensory properties	"If the taste and appearance of the food was not significantly altered, if the insects were produced sustainably..." (C26)
		Sustainability	
		Nutritional value	"If the eating quality and nutritional value of the products remain consistent" (C32)
		Need for more information	"I would need more information about whether insects are reasonably part of the animals' natural diet...I understand this would not be natural for cows, sheep, cattle and so more information about this would help my decision making." (C58)
Which factors affect the willingness of Irish farmers to use IBF for their animals?	Product-related factors	Safety concern	"If enough research has been done on the environmental impact of the insect production and alterations to the food chain, if it is proven that it is safe for herbivores to eat insects." (F9)
		Sustainability	"There is a lot of wheat used in the chicken meal on our farm...If we could feed insects to the chickens, we may be able to use the wheat to make other products which will earn more than the insects cost to produce. Thereby increasing Ireland's net agricultural outputs" (F6) "If there is less impact on the environment from using insects as a source of feed" (F5)
		Availability	"If it is not available to buy at local stores, I wouldn't be special ordering in insect meal" (F1)
		Nutritional value	"Higher protein content than grain, deeper yolk colour and more flavour in eggs" (F13)
		Sensory properties	
		Need for more information	"Is it likely to cause allergic reaction to individuals with hayfever?" (F24) "Would there be a way to grow the insects using the waste products from the chicken house? Currently the chicken manure goes to the tillage farmers who plough it in and grow grain to be sold back to us as more feed. If we replace grain with insect protein the tillage men might not take our manure..." (F9)