

Report



The quality of rapeseed oil

Responses from crushers, manufacturers and processors

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1 Methodology

ADAS carried out a stakeholder review to evaluate industry needs with regard to nutritional value, cooking, processing and storage properties of oil from oilseed rape. A range of quality parameters were investigated including the levels of saturated and unsaturated fatty acids to enhance health and cooking quality, and factors that may enhance manufacturing performance, shelf life and storage potential. ADAS worked with the project team to develop two questionnaire templates to target a) oilseed crushers as producers of rapeseed oil, and b) food manufacturers, processors and retailers who are the key users of rapeseed oil. See Appendix for questionnaire templates.

Oilseed crushers were contacted to understand any implications regarding the oil extraction process. This included identifying the key attributes of oilseed rape that result in high oil extraction, questions around changes in customer demand for oils with specific physical or nutritional attributes, and challenges they face with regard to segregation of different types of oilseed rape seed.

A range of food processors and manufacturers who are using rapeseed oil in different ways were contacted to understand their needs using oil in food production. Questions included their perceptions of limitations on use, and changes in customer demand. Retailers reflecting the different segments of the market (premium, mid-range and discount) were contacted to consider consumer demand and storage aspects for oil sold in bottles, and to understand requirements for use in in-store cafes.

For each group of interview candidates a semi structured interview template was developed with questions relevant to them (crushers, processors and manufacturers and retailers). ADAS used the Smart Survey software programme to collect and collate interview data. Interviews were conducted either by telephone or in some cases businesses preferred to complete the questionnaire online. Responses were reviewed for completeness and in some cases follow up questions were asked. The team aimed to interview a selection of retailers, processors and manufacturers to capture the different uses of rapeseed oil e.g. as frying oil, eating cold, in baked goods, in processed foods, in fast foods.

ADAS identified and contacted a selection of businesses including the two UK based crushers, seven processors and manufacturers using oils in different ways, nine fast food restaurants, three contract catering businesses and five retailers. The response rate is summarised in Table 1 below. The response rate was below what would normally be expected for this type of survey and may have been attributed to many factors such as commercial sensitivity, lack of time or not being able to reach the most appropriate person knowledgeable on this topic.

Table 1 - Stakeholders contacted and number of responses

Type of Business	Businesses contacted	Number of responses
Crushers	2	2 from same company, different teams
Processors and manufacturers	7	3
Fast Food Restaurants	9	1
Contract Catering	3	2
Retailers	5	0

2 Crushers

The two UK based oilseed crushers were invited to participate in an interview and one agreed to participate. The project team were able to interview two different representatives from this company who were in both management and technical roles. The evidence presented here is based on interviews with these two representatives of the same company.

2.1 Types of oil produced

The crusher explained that modern oilseed crushing is done using the solvent extraction process with hexane being the solvent used in this process. Two types of refined and deodorised oils are produced: standard rapeseed oil and high oleic rapeseed oil. High oleic rapeseed oil (HOR) is more stable than standard oil in frying. HOR typically has lower polyunsaturated fatty acids than standard rapeseed oil, hence has less of the most unstable fatty acids than standard oil. Also it can have nutritional benefits as it is high in unsaturated fat and low in saturated fat. Because HOR has lower polyunsaturated fatty acids than standard rapeseed oil, as a stand alone oil, it is not necessarily higher in nutritional benefit than standard rapeseed oil. Once it is heated, HOR is considered more beneficial, because it breaks down more slowly. HOR normally has a price premium compared with standard rapeseed oil.

The two attributes of the seed that have the most influence over oil extraction rates are oil content and moisture content.

2.2 Demand for oils

Customer demand for oil depends on how the oil is to be used. For oil that is sold in bottles for household use, consumers look for low saturated fat and high mono and polyunsaturated fats. This type of oil is perceived as having good nutritional content. Oils with long shelf life are favoured by retailers as well as consumers.

For sales of oil to be used for deep frying as for use in fast food restaurants, catering facilities and in some food processing, customers look for lower polyunsaturated oils as they have a longer frying life. For this user the most important characteristic is for the oil to remain stable when used repeatedly in frying.

2.2.1 Nutritional attributes

The demand for specific nutritional characteristics of rapeseed oil depends upon how the oil is to be used. From the crusher's perspective, oil use may be split into two main categories of use:

- 1) Salad use, shallow or pan frying
- 2) Deep frying

For consumers using the oil for salad use, shallow or pan frying, the nutritional attributes they favour are **high levels of: α -linolenic acid (omega-3), linoleic acid (omega-6), polyunsaturated fat, and tocopherol (vitamin E).**

For consumers using the oil for deep frying, **α -linolenic acid (omega-3), linoleic acid (omega-6), and polyunsaturated fat are not desired properties** as increased amounts have a negative impact on the physical properties of oil. The main concern of these users are the physical properties e.g. the stability of oil when used for repeated frying. The presence of high levels of polyunsaturated fats causes oil to break down more quickly in deep frying.

While not identified as a main use of rapeseed oil, it was noted that there **may be some interest by manufacturers of spreads for increased phytosterol content**. While this view was presented by the crusher, we were not able to verify this as the spreads manufacturers contacted declined to be interviewed.

2.2.2 Physical attributes

The physical attributes noted by the crusher as most important are smoke point, oxidative stability, reusability and taste. Smoke point is particularly important when oil is used repeatedly, as the more oil is heated the more it breaks down, which can result in reduced smoke point meaning oil has to be discarded more quickly which has a cost implication. For customers who are using oil for deep frying, they want a high smoke point that does not decline too quickly.

High oxidative stability is also important when oil is used repeatedly. Oils that are high in saturated fats are more stable, so for rapeseed oil which is very low in saturated fat, improving oxidative stability would be desired. **Increased stability of oil can be achieved by lowering the α -linolenic acid (omega-3), and linoleic acid (omega-6) while increasing the oleic acid content, or by increasing the natural antioxidants found in the oil (tocopherols).**

Consumers of rapeseed oil expect a bland neutral taste which is generally achieved when crushing rapeseed in the UK, though the crusher believed that taste was subjective and noted that rapeseed oil is not consumed much in Spain. They felt that this was due to a difference in how they perceive the taste of rapeseed oil as compared to other available oils.

There were no significant concerns noted around shelf life as bottled rapeseed oil generally lasts up to 12 months in the bottle if properly stored. Hydrolysis was not considered a problem as rapeseed oil does not normally contain moisture as long as the seed is of the correct moisture content when crushed.

With regard to colour, customers expect rapeseed oil to be pale yellow to golden in colour. Sometimes it has a greenish tint which is not favoured by consumers. For bottled oil consumers expect the oil to be pale in colour. Crushers achieve this when processing by adding bleaching earth to remove the natural chlorophylls found in the oil. According to the crusher, it would be **advantageous to have paler coloured crude oil direct from the seed as this would reduce cost of production of the oil.**

2.3 Segregation Issues

In general the supply of oilseed rape the crusher receives from the farmers is homogeneous with farmers doing a good job keeping standard rapeseed separate from high oleic rapeseed by load. On limited occasion there may be incidents of field contamination from volunteer rape from previous crops, but this has not posed significant problems.

The crusher's facility is set up to manage the segregation of these two types of seed and oil and generally do this by campaign where they will process standard rapeseed on certain days, then clean equipment and process high oleic on other days. No concerns were raised about grain traders ability to keep these two types of rapeseed separate throughout the supply chain.

Keeping the oils segregated is a big challenge for the crusher. The tanks used to store the oils are prohibitively expensive so they would need to see significant demand for other types of rapeseed oil with new traits to warrant investment in new tanks and methods to handle more different types of oil that would need to be segregated.

Other logistical challenges noted were concerns over traffic, shortages of available lorries for transport, and keeping seed separated based on qualities such as moisture and oil content. The

increased trend toward local provenance with customers wanting to be able to trace the oil back to the oilseed has increased pressure on crushers to put protocols in place to satisfy this demand.

The main area where the crusher feels research funding should be allocated is for breeding resistance to pest and disease to support farmers' ability to produce rapeseed. Changes to pesticide authorisation e.g. withdrawal of neonicotinoids for use on rapeseed crop has made it more difficult to grow rapeseed in the UK. If rapeseed could be modified to be resistant to cabbage stem flea beetle then farmers could grow the crop more reliably, and would be able to produce reliable volumes of good quality crops at economic prices.

3 Manufacturers and processors

Six survey responses were collected from manufacturers, contract catering and fast food businesses. Although contacted, no retailers were able to participate in the project.

3.1 Uses of oil

Respondents commented on the different features they are looking for when selecting an oil, including taste, consistency, nutritional content, and cost. The importance of these features is noted below:

- Taste – the importance of taste or flavour varies depending on the percentage of oil used in the products. If there is a low percentage of oil used in the product, then taste is not that important. Another respondent commented that they are looking for a bland or neutral flavour. Another mentioned the importance of having no rancid or off odours or flavours.
- Consistency – one respondent commented that the importance of consistency depends on the product, with another saying that viscosity is important and another commenting that oil should be clear and uniform
- Nutritional content – one respondent explained that they are looking for typical nutritional values. Another respondent commented that whilst nutritional content is important, in their particular circumstance, the importance is low as they only use a small percentage of oil in their product. One respondent noted that they are trying not to use groundnut oil due to it being an allergen.
- Cost – cost was the most important factor for one of the respondents. They commented that the cost of rapeseed oil is higher than sunflower oil and that they may switch their choice of oil where cost is an advantage. The proximity to factories in the UK was also noted as a factor as transport costs are high.
- Sustainability – two respondents noted that sustainability was an important feature affecting their choice of oil, with one respondent noting that they did not use palm oil. The second respondent said they were trying to use less palm oil, and so are replacing palm with rapeseed and sunflower oil for sustainability reasons and consumer perception.
- Smoke point - **One respondent listed smoke point as a key feature when selecting an oil.** This respondent rated this attribute as very important. One respondent noted that they look for 260C minimum smoke point.

When asked what oils are used within the business, respondents commented that oil choice is related to the suitability of the oil to create the specific product, as well as the choice of oil being influenced by consumer perception, customer specifications, and sustainability considerations. Oil choices also vary by country with preferences in some countries such as Spain not favouring rapeseed oil.

For example, one respondent typically used vegetable oils, including rapeseed, for cakes and biscuits, however, they used palm oil for puff pastry as this contains a higher level of saturated fat which is needed to give structure and form in the finished product. This respondent also used palm oil for doughnuts as this lowers the cost and reduces the oil surface feel to the doughnut.

One respondent noted that rapeseed oil is especially favoured for use as a topical oil spray in manufactured snack foods.

Another respondent commented that rapeseed oil is chosen due to its 'nutty' taste.

Another respondent commented that they use a blend based on their customer's specification, and use animal fats for basting to create particular flavours.

Error! Reference source not found. Table 2 shows the different oils used by the companies surveyed.

Table 2: The use of different types of oils within respondents' businesses

Type of oil	Use within businesses	
Rapeseed	Cakes and biscuits Frying Par Frying Snack foods	Along with sunflower oil, rapeseed is the most widely used oil for marinades and food ingredients Used for Par frying as part of a blend Used in batch baking and as a topical spray for snack food manufacturing
Palm	Puff pastry Frying for doughnuts Snack foods	Used in marinades and food ingredients Used in frying
Olive	Marinades and dressings	Used in marinades and food ingredients
Sunflower	Cakes and biscuits Marinades Par Frying Snack foods	Used for Par frying, Along with rapeseed oil, sunflower is widely used for marinades and food ingredients Batch baking and as topical spray for snack food manufacturing
Vegetable	Cakes and biscuits Frying	Used in baking and frying
Groundnut	Dressings and flavours	Only used by one respondent and is phasing out due to groundnut being an allergen
Other	Dressings	Coconut oil is also used Rapeseed oil mixed with other oils to make flavoured oils for dressings Cottonseed, corn, rice bran, soy

	Snack foods	
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3.1.1 Costs and availability

It was raised that vegetable oils are often a blend of sunflower, vegetable and rapeseed oils, with the ratio of each oil tending to vary depending on the season or harvest quality. The cost goes up and down with markets, with prices often aligned with the price of sunflower oil. It was also noted that relative costs are influenced by global supply and demand balances as the oil complex is a traded commodity. As such, the cost position can vary from year to year. It was highlighted that rapeseed can be costly compared to other vegetable types. However, one respondent thought the cost of rapeseed oil was less than other low saturated, high stability oils.

The availability of rapeseed oil was considered good by all respondents. However, it was mentioned that the availability of high oleic rapeseed oil can be tight at times. One respondent had heard about some problems with transport in Europe in 2018 because of the water levels in the river Rhine, however, this didn't affect their organisation.

3.2 Benefits of rapeseed oil

3.2.1 Baking

One respondent used rapeseed oil for baking, using a gas fired oven with convection. The respondent found that rapeseed oil was useful for cake softness and enhancing shelf life of sweet muffins in particular. When baking cakes and sweet muffins, this respondent said that they would choose to use rapeseed oil over other oil types due to this enhancement of shelf life.

Respondents were asked to rate the physical properties that made rapeseed oil a good oil to use (with 1 being poor, and 5 being excellent). The properties which make rapeseed oil a good oil for baking are shown in **Error! Reference source not found..** The highest rated properties were colour, hydrolysis, taste and shelf life.

Table 3: The physical properties of rapeseed oil which make rapeseed oil a good oil for use in baking

Physical property	Score out of 5 (1 being poor, and 5 being excellent)
Smoke point	2.75
Shelf life	3.25
Oxidative stability	2.33
Hydrolysis	3.50
Polymerization	2.50
Taste	3.50
Reusability	2.75
Colour	4.25

3.2.2 Frying

It was noted that rapeseed oil would have advantages for frying in that it has ‘quicker hygiene times’ for fryer and freezer cleaning. However, for the company who raised this point, the brand preference was to use sunflower oil or a sunflower and rape blend.

Respondents were asked to rate the physical properties that made rapeseed oil a good oil to use (with 1 being poor, and 5 being excellent). The properties which make rapeseed oil a good oil for frying are shown in 4. The highest rated properties were colour, smoke point, reusability and hydrolysis.

Table 4: The physical properties of rapeseed oil which make rapeseed oil a good oil for use in frying

Physical property	Score out of 5 (1 being poor, and 5 being excellent)
Smoke point	3.00
Shelf life	2.75
Oxidative stability	2.00
Hydrolysis	3.00
Polymerization	2.00
Taste	2.75
Reusability	3.00
Colour	4.50

Table 5 The physical properties of rapeseed oil which make rapeseed oil a good oil for use as a topical oil (spraying)

One respondent noted the benefits of using rapeseed oil as a topical oil which is sprayed on in the snack food manufacturing process. The scores of this one respondent, which are particularly high, are reflected here.

Physical property	Score out of 5 (1 being poor, and 5 being excellent)
Smoke point	5
Shelf life	4
Oxidative stability	3
Hydrolysis	4
Polymerization	4
Taste	4
Reusability	N/A
Colour	5

3.3 Limitations of rapeseed oil

With regards to baking, rapeseed oil cannot be used for making puff pastry. This is because **rapeseed does not have the right texture to create the lamination structure within puff pastry; a slightly harder solid fraction is required. Using a texturized fat benefits puff pastry manufacture and gives less oiliness to the surface feel.**

Rapeseed oil cannot be used in instances where the oil needs to be in solid form, for example as an ingredient for chocolate. The melting point is an important consideration for this process.

One respondent involved in frying processes commented that rapeseed oil is useable, however, it is not the company's oil of choice.

Another respondent producing snack foods noted that **rapeseed oil has a relatively short shelf life (3-9 months) and oxidizes quickly potentially leading to an off-flavour in fried foods. Another limitation noted by this respondent is the GMO status of rapeseed** as non-GMO raw materials are the preference in many countries. This comment was referring to non-UK rapeseed oil as all UK rapeseed oil is non-GMO.

3.4 Nutritional qualities of rapeseed oil

Respondents commented that nutrition is important, and that oil generally needs to be low in saturated fats and higher in good fats. However, this can sometimes not be practical for

the products being made, for example an oil with higher saturated fat is needed for the manufacture of puff pastry. It was also noted that the nutritional qualities of the oil are less important where only a very small quantity is used in the product.

Three respondents were able to comment on the nutritional traits which could make rapeseed oil more suitable for their use. The first suggested an increase in saturated fat and omega-3 were most important, followed by an increase in omega-6, omega-9, Vitamin E and Vitamin K. **The increase in saturated fat would enable them to use rapeseed oil in the manufacture of puff pastry, with the increase in vitamins and omega 3, 6 and 9 giving added value which consumers are looking for.**

The second respondent said they like to use rapeseed oil when they are looking for a healthy oil, but that this varied by country as they are a global food business. The traits they considered to be **most important and would be beneficial if increased are omega-3, omega-6, omega-9, and tocopherol. Traits they would like to see decreasing are saturated fat, vitamin K, phytosterols and polyphenol.** They did not elaborate on why this would be.

The third respondent who is producing snack foods noted that they would like to see an increase in omega-9 and monounsaturated fat, and a decrease in omega-3 and polyunsaturated fat.

4 Conclusions

Feedback from elements of industry dealing with oilseed rape post farm-gate (oilseed crushers, food manufacturers & processors and caterers) identified several rapeseed oil quality characteristics that, with improvement, would increase the use and demand for rapeseed oil including;

- Greater α -linolenic acid (omega-3), linoleic acid (omega-6), polyunsaturated fat, tocopherol (vitamin E) and vitamin K. This will provide enhanced nutritional characteristics for salad dressings and shallow pan frying.
- Lower α -linolenic acid (omega-3), linoleic acid (omega-6), and polyunsaturated fat for deep pan frying. To a large extent these attributes are being provided by HOLL (High Oleic Low Linoleic) varieties, but can they be enhanced further?
- Greater phytosterol content for the manufacture of spreads
- Lighter oil colour. This would reduce the cost of production since bleaching agents currently used.
- Lower smoke point and better oxidative stability to enhance deep frying and baking properties.
- Increase in saturated fat would enable rapeseed oil to be used in the manufacture of puff pastry. Currently palm oil is a key ingredient for this.

New classes of oilseed rape would probably need to be suitable for a large market to justify additional costs of segregating the seed and the oil by large scale crushers. Segregation is less of an issue for small scale crushers (e.g. cold presses).

5 Appendix

5.1 Questions for food processors, manufacturers and catering businesses

Rapeseed oil: Food processors, manufacturers and catering businesses

We are working on a DEFRA funded project with the University of York looking at the feasibility of improving the nutritional, cooking quality, and storage traits of rapeseed oil. The project will explore the genetic variability available through the Oilseed Rape Genetic Improvement Network (OREGIN), and will look at the feasibility of improving oil quality traits. The study is looking at the needs within the sector, the potential for variation, and the feasibility of the different options identified. This will feed into a business plan for a four year programme of work to undertake targeted improvement of oilseed rape against the priority traits. To better understand the needs of the rapeseed oil sector in terms of nutrition, cooking quality and storage, we will be interviewing a range of stakeholders, including food manufacturers, food processors, catering businesses, retailers and oilseed crushers. All data collected will be used anonymously and will feed into the later stages of the project.

Section 1 – Introduction

Q1: Company Name:

Q2: Type of Business:

Q3: Respondent Name:

Section 2 – Uses of oil

Q4: Please give details of the cooking/baking/frying methods you use in your operation:

- Cooking:
- Baking:
- Frying:
- Other:

Q5: What are the key features you look for when selecting an oil for a product? (Please give details for each aspect):

- Taste:
- Consistency:
- Nutritional content:
- Smoke Point:
- Cost:
- Other:
- Comments:

Q6: How does your choice of oil type vary between products? Please explain the decision process used for deciding which oil to use for which product:

Q7: Please give details of any oils used by your company and for which product they are used

- Rapeseed:
- Palm:
- Olive:
- Sunflower:
- Vegetable:
- Groundnut:
- Other oil type:
- Comments:

Q8: How does the cost of rapeseed oil compare to other possible alternative oil types?

Q9: How would you describe the availability of rapeseed oil for your business? Is it readily available in the volume and format that you require?

Section 3 - Benefits of rapeseed oil

Q10: In your experience, what uses are most appropriate for rapeseed oil?

Q11: What physical properties make rapeseed oil a good oil to use? Please rate the following attributes on a scale of 1-5 with 1 being poor and 5 excellent.

	Cooking	Baking	Frying	Other
Smoke point				
Shelf life				
Oxidative stability				
Hydrolysis				
Polymerization				
Taste				
Reusability				
Colour				
Other				

Comments:

Q12: In what situation(s) would you choose to use rapeseed oil over other oil types?

Section 4 – Limitations of rapeseed oil

Q13: What limitations are there in the use of rapeseed oil in your business? Where can it not be used and why?

Q14: What properties make rapeseed oil unsuitable for your use? Please can you comment where these factors inhibit your use of rapeseed oil:

- Smoke point:
- Shelf life:
- Oxidative stability:
- Hydrolysis:
- Polymerization:
- Taste:
- Reusability:
- Colour:
- Other:
- Comments:

Section 5 – Nutritional aspects of rapeseed oil

Q15: How important are nutritional qualities of rapeseed oil to your business?

Q16: Do you think increasing or decreasing the following traits would make oilseed rape oil more desirable for wider use in your business? Please move the slider in your preferred direction of change (where 3 is neutral and 5 is increasing) – for the purposes of email/paper version – put a cross in the selected box

	1	2	3 (neutral)	4	5
α-linolenic acid (omega-3)					
Linoleic acid (omega-6)					
Oleic acid (omega-9)					
Saturated fat					
Monounsaturated fat					
Polyunsaturated fat					

Tocopherol (vitamin E)					
Vitamin K content					
Phytosterols content					
Polyphenol content					
Other (please specify below)					

Comments:

Section 6 – Retail only

Q17: Do you use rapeseed oil in your cafes/ in store bakeries? (If yes, go back to start of questions, if no carry on to section 7)

Section 7 – Retail only – sales of rapeseed oil in bottles

Q18: How important are nutritional qualities of rapeseed oil to your customers?

Q19: Do you think increasing or decreasing the following traits would make rapeseed oil any more desirable for consumers? Please move the slider in direction that reflects your perception of consumer demand (where 3 is neutral and 5 is increasing) – for the purposes of email/paper version – put a cross in the selected box

	1	2	3 (neutral)	4	5
α-linolenic acid (omega-3)					
Linoleic acid (omega-6)					
Oleic acid (omega-9)					
Saturated fat					
Monounsaturated fat					
Polyunsaturated fat					
Tocopherol (vitamin E)					
Vitamin K content					
Phytosterols content					
Polyphenol content					

Other (please specify below)					
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Comments:

Q20: What do you think customers believe is the main oil used in vegetable oil?

Q21: Can you describe customer feedback around the use of rapeseed oil?

- Nutritional properties:
- Physical properties:

5.2 Questions for oilseed crushers

Questions for oilseed crushers (implications regarding the oils extraction process)

We are working on a DEFRA funded project with the University of York looking at the feasibility of improving the nutritional, cooking quality, and storage traits of rapeseed oil. The project will explore the genetic variability available through the Oilseed Rape Genetic Improvement Network (OREGIN), and will look at the feasibility of improving oil quality traits. The study is looking at the needs within the sector, the potential for variation, and the feasibility of the different options identified. This will feed into a business plan for a four year programme of work to undertake targeted improvement of oilseed rape against the priority traits. To better understand the needs of the rapeseed oil sector in terms of nutrition, cooking quality and storage, we will be interviewing a range of stakeholders, including food manufacturers, food processors, catering businesses, retailers and oilseed crushers. All data collected will be used anonymously and will feed into the later stages of the project.

Section 1 – Introduction

Q1: Company name

Q2: Type of business

Q3: Name of respondent

Section 2: Crushing activity

Q4: Please describe the oil extraction method you are using

- Solvent extraction,
- Cold pressed
- Comments

Q5: What are the key attributes of oilseed rape seed that results in high oil extraction?

- Specific weight
- Oil content,
- Colour,

- Ripeness
- Moisture content
- Other (please specify)
- Comments

Q6: Are you seeing any changes in demand for oils with specific attributes (physical or nutritional)?

Q7: Which nutritional attributes are you seeing increased demand for?

- α -linolenic acid (omega-3)
- Linoleic acid (omega-6)
- Oleic acid (omega-9)
- Saturated fat
- Monounsaturated fat
- Polyunsaturated fat
- Tocopherol (vitamin E)
- Vitamin K content
- Phytosterols content
- Polyphenol content
- Other (please specify below)

Q8: What physical attributes are you seeing increased demand for?

- Smoke point
- Shelf life
- Oxidative stability
- hydrolysis
- polymerization
- taste
- reusability
- colour
- Other (please specify below)
- Comments

Q9: Which nutritional characteristics result in decreased demand?

- α -linolenic acid (omega-3)
- Linoleic acid (omega-6)
- Oleic acid (omega-9)
- Saturated fat
- Monounsaturated fat
- Polyunsaturated fat
- Tocopherol (vitamin E)
- Vitamin K content
- Phytosterols content
- Polyphenol content
- Other (please specify below)
- Comments

Q10: Which physical characteristics result in decreased demand?

- Smoke point
- Shelf life
- Oxidative stability
- hydrolysis
- polymerization
- taste
- reusability
- colour
- Other (please specify below)
- Comments

Q11: In your crushing facility do you segregate different sources of seed based on oil properties?

Q12: What challenges does segregation cause in the production of oils?

Q13: Do farmers manage to maintain segregated supplies of oilseed rape seed from field to farm gate?

Q14: Do grain traders manage to maintain segregation through to the point of crushing?

Q15: What challenges are observed up the supply chain in maintaining the segregation of oilseed rape crops with different oil properties?

Q16: What logistical challenges do you face in crushing UK rapeseed?

Q17: Do you think that improving traits in oilseed rape would increase demand for oil by your food business customers?