

SR684 Case study: Consumer messages concerning brown crab products in selected European countries

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Introduction

- This case is an in-depth review of brown crab products as seen from a consumer perspective.
- The case is produced as a specific output of the wider Acrunet Activity 5 which seeks to understand the wider system of brown crab practices from production to consumption.

Aims and objectives

- The aim of this case is to *understand the current messages consumers receive around brown crab products to help inform communication strategies for strengthening brown crab reputation for European consumers.*
- The case objectives are to:
 - Identify a range of broad issues that may be a threat to the industry
 - Produce a crisis pack with technical background upon which position statements could be based
 - Inform best practice guidelines on what is produced on pack.
- The case is intended as a 'living document' supporting industry communication, such as Activity 7 ("*Strategic Recommendations for Communications in 5 countries*" in defining/formulating appropriate consumer messages and producing ready-to-use position statements).

Approach

- The approach to this case involved determining the scope and required research tasks.
- The scope of the exercise was determined by the following parameters:
 - *Key messages:* Identifying key messages for consumers in a range of environments (in store, on packaging, in mass media and prescriptors (opinion leaders), and from public agencies).
 - *Consumers:* defined as those in three European markets - the UK (and as proxy for Ireland), France, and Spain (and as a proxy for Portugal)
 - *Timeframe:* a five year timeframe, 2009-2014
- Research tasks undertaken included:
 - *Topic identification.* Key topics (ethics of production, food safety, labelling, and stocks) and messages of relevance to brown crab were identified. Where possible, other protein or seafood sectors (meat, poultry, salmon) with experience of this topic were identified.
 - *Media review.* A monitoring review was undertaken of broadcast, digital, print media using a specialist agency to establish scale and location of messages against key topics (Annex II).
 - *Review of existing messages through brown crab products.* The media review was supplemented with an analysis of the on-pack messages (provided by Activity 6).
 - *Technical review.* The technical specifications of each issue were defined and a 'white paper' created to establish key facts. Key facts were drawn from a literature review of published evidence on each topic.
 - *Crisis messaging response.* Drawing on tasks 1-4 a crisis pack was produced detailing key messages and suggested questions and answers for crisis management of specific issues (Annex I).

- The case was produced between June and September 2014, and validated with industry between October and January 2015.

Conclusions

- Steps should be taken to support the brown crab industry in managing industry reputation and help shape messages on specific issues of concern.
- Such a reputation management initiative should build on the material in this case study.
- The initiative should seek to create specific PR responses on key issues. This should be supported with a toolkit that could potentially contain:
 - A press release
 - Key spokespersons or ambassadors ready to take part
 - Quotes from relevant key figures and recognised experts, and
 - Q&A on all aspects of the issue.
- The reputation initiative should be developed by relevant agencies in partner countries either individually or in concert as necessary.
- In the near term, effort should be directed predominantly on developing reputation responses to critical issues facing the industry; 'cadmium' and also 'clawing'.

ANNEX I (TECHNICAL REVIEW)

Topic:	Ethics of production (Animal Welfare)	
Issue:	Clawing	
Industry practice:	Removal of claws from captured animals, and subsequent discarding of crippled live animals.	
Impacts of industry practice		
	Evidence for issue	Uncertainty
	<ul style="list-style-type: none"> The basic neural pathways that respond to and transmit nociceptive stimuli that might be perceived as pain in higher mammals are found in crustacea. Their activity is blocked or reduced by similar analgesic compounds. The accepted neurological pathways of sentient pain perception are not present in crustacea. Autotomy is a natural defence mechanism of crustacea. Mortality can result from 'clawing'. Claw loss causes loss of haemolymph, but this is limited by muscle contraction at the site and 'clotting' of the haemolymph on contact with seawater. There is a risk of infection at the site of claw removal; however, crabs have internal defence mechanisms as well as external ones (physical). It is suggested that 'clawed' crabs lose body condition due to reduced feeding rates (reduced ability) and diverting energy in to limb regeneration. It has been suggested that sub-optimal feeding and diverting energy into claw regeneration can reduce growth rates by extending the inter-moult period and decreasing the growth increment on moulting. Sub-optimal feeding may reduce reproduction rates within the stock, as 'clawed' females have an extended inter-moult phase (reducing the opportunities to mate) and males use the claws during mating (potentially reducing success at mating). Animals with no, small or asymmetric claws are worth less on the market than animals with full-sized claws. Regenerated claws remain smaller than the originals. Legislation at EU level allows for 1% clawing by weight of catch. 	<ul style="list-style-type: none"> There is no evidence that nociceptive stimuli are or can be interpreted as the subjective, emotional experience of pain by crustacean; however, it has not been ruled out conclusively. Some physiologists suggest existence of alternative neurological pathways of pain perception. Mortality resulting from 'clawing' has not been quantified Infection rates have not been studied; however, there has been limited analysis of mortality rates from claw 'nicking' (which might be considered a similar type of wound). Feeding rates and body condition in 'clawed' crabs has not been explored fully or quantified. Extension of the inter-moult period and decreased growth increments have not been proven conclusively. Potential reduced reproductive input to the stock has not been investigated fully, but data from lobsters studies suggests that it is likely. The potential subsequent economic loss resulting from 'clawing' has not been quantified.
Technical conclusions		
	<ul style="list-style-type: none"> The evidence listed is predicated on the assumption that claws are autotomized (i.e. shed / discarded 'voluntarily'). Industry practice is that claws are torn off and most (95%) crabs die. High prices are sustained by high market demand. Stock implications: clawing undersized crab could compromise stock integrity due to compromised breeding ability and mortality. A highly negative aspect of industry practice that is not adequately addressed. Industry is aware of the issue. 	
Media conclusions		
	<ul style="list-style-type: none"> The number of articles referring to this issue is increasing (of 40 articles in the last 5 years, a third have appeared in 2014 so far). Although the number of articles is relatively low (compared with other issues), articles are highly focussed and negative. There is a specific focus on brown crab. Topic is regional: UK largely (and potentially Ireland) due to being producer/supplying countries. 	
Risks		
	<ul style="list-style-type: none"> Weak arguments based on scientific uncertainty about pain and difficulties implementing animal welfare measures. Reputational risks and stocks risks. 	
Opportunities		
	<ul style="list-style-type: none"> There is an 'opportunity window' to promote collective action at different levels 	
Recommended action		
	<ul style="list-style-type: none"> Management issues: include legislative tools, i.e. clawing under authorized premises (WP3 – management). Quality issues: good practices: increase sustainability and strengthen sectoral reputation through responsible fisheries scheme. (WP4 quality standard) Communication issues: Produce Q&A for clawing (WP7 education). 	

Topic:	Ethics of production (Animal Welfare)	
Issue:	Harvesting	
Industry practice:	Rough handling of the animals during removal from the traps, grading and transfer to keep containers	
Impacts of industry practice		
	Evidence	Uncertainty
	<ul style="list-style-type: none"> • Removal from the water stresses the animals. • Vigorous removal from the trap can damage the animal and induce stress responses. • Throwing, tossing or dropping graded animals into the keep containers, rather than placing them, mechanically shocks the animal, and may cause injury and wounds and induce stress responses. • Injuries and wounds are potential sites for infection during storage. Haemolymph takes longer to 'clot' in air than in seawater. • Animals that have been stressed or injured are more likely to die during storage, and it has been suggested that flesh quality might be degraded in survivors. • This strongly affects both mortality and quality in later stages of the chain • Good practice guides have been developed. 	<ul style="list-style-type: none"> • It has proven difficult to evaluate changes in meat quality in stressed and unstressed animals (cf mammals).
Technical conclusions		
	<ul style="list-style-type: none"> • The crab supply chain is well known (low level of uncertainty). • Harvesting method (trapping) may be considered an “environmentally friendly” fishing method. • Harvesting is less stressful for the animals. • There are potential stress points within the handling chain; however, Industry looks to minimize these during particular stages (unloading from fishing boats, loading and unloading the truck). This affects only the live chain. • Industry has a strong incentive to promote quality, harvesting and handling, but is conservative in respect of changing practices. 	
Media conclusions		
	<ul style="list-style-type: none"> • The harvesting issue is far more prevalent in some countries, particularly producing areas - UK, France. • Different national perspectives; in UK fish are to be protected, whereas in France fish, as food, need to be killed. • Attention to this issue has been stable (issue was bubbling away); however, there has seen a recent surge in interest. • Neutral favourability may indicate general ambiguity on this issue. 	
Risks		
	<ul style="list-style-type: none"> • None specified 	
Opportunities		
	<ul style="list-style-type: none"> • None specified 	
Recommended action		
	<ul style="list-style-type: none"> • Follow Good Practice Guides (Activity 4) 	

Topic:	Ethics of production (Animal welfare)
Issue:	Storage
Industry practice:	Out of water storage throughout value chain
Impacts of industry practice	
Evidence	Uncertainty
<ul style="list-style-type: none"> Crabs cannot respire efficiently in air as gill structure cannot be maintained. Crabs cannot eliminate metabolic waste products whilst in air and consequently store them within the body for excretion when re-immersed. This has implications for in-water storage facilities. Crabs can use anaerobic metabolism during aerial exposure. Prolonged storage of aerobic and anaerobic metabolites within the body invokes stress responses that degrade the quality of the animal. Temperature can be a major stress factor. There is a risk of over-heating unless crabs are protected adequately from the environment. Immersed (in-water) storage is superior, providing adequate dissolved oxygen levels are maintained in the water. (Note: water filled tanks on board a vessel have implications for stability unless properly designed and fitted.) Claw 'nicking' prior to storage injures the animal; it may provide a site for infection and a level of mortality can be associated with the practice. Good practice guides have been developed. 'Nicking' is a practice carried out only for the live value chain (shipping). 'Nicking' failures can cause injury to workers along the value chain. Haemolymph does not coagulate in air; crabs that are 'nicked' and left in air will lose blood (haemolymph), and die. This affects both mortality and quality in later stages of the chain. 	<ul style="list-style-type: none"> There is limited data on mortality rates associated with claw 'nicking'.
Technical conclusions	
<ul style="list-style-type: none"> The term, 'nicking', can give the wrong impression; tendons are not connected to nerves, so animals would not be able to feel pain (should they be able to anyway). This practice is the lesser of two evils; it prevents animals fighting/damaging each other, helping to maintain quality of live crab through the chain. 	
Media conclusions	
<ul style="list-style-type: none"> Not considered 	
Risks	
<ul style="list-style-type: none"> Not considered 	
Opportunities	
<ul style="list-style-type: none"> Potential for developing 'banding' techniques to restrain claws. Investigate how 'nicking' affects quality. Improving storage related processes will directly increase profit through the value chain 	
Recommended action	
<ul style="list-style-type: none"> Follow Good Practice Guides (Activity 4) 	

Topic:	Ethics of production (Animal Welfare)	
Issue:	Slaughter	
Industry practice:	Methods used, particularly 'drowning'	
Impacts of industry practice		
	Evidence for concern	Uncertainty
	<ul style="list-style-type: none"> Placing live crabs directly into boiling water or a steam cooker can result in high levels of claw loss. It is also considered by some to induce the experience of 'pain' for the animal prior to death. The widespread practice of 'drowning' live crabs in freshwater prior to cooking results in less claw loss, but causes considerable osmotic stress to the animal prior to death. The practice is thought to cause stress. 'Pithing' (inserting spike into crab brain) is an efficient slaughter method when performed by a competent operator, but is not commercially viable when dealing with large numbers of animals. Electrical stunning systems for use prior to cooking have been developed, but not widely adopted by the industry. This is the RSPCA preferred method of killing. Other methods are used, eg using cold fresh water and vinegar, etc. (According to the evidence, some methods are better than others at mitigating stress.) 	<ul style="list-style-type: none"> There is no evidence that nociceptive stimuli are or can be interpreted as the subjective, emotional experience of pain by crustacea, but it has not been ruled out conclusively. Some physiologists suggest that alternative neurological pathways of pain perception may exist.
Technical conclusions		
	<ul style="list-style-type: none"> Loss of legs is minimized when crabs are put to sleep. The current industry practice of using cold water is an acceptable trade-off between animal welfare and feasible industry costs. There is a lack of evidence about the impact of some killing methods on animal welfare. 	
Media conclusions		
	<ul style="list-style-type: none"> Exposure of negative press is around slaughter, rather than harvesting or storage. 	
Risks		
	<ul style="list-style-type: none"> This issue remains ambiguous due to uncertainty about ability to feel pain (and suffering). 	
Opportunities		
	<ul style="list-style-type: none"> More research is underway and will be available in due course 	
Recommended action		
	<ul style="list-style-type: none"> Check whether Acrunet quality standard addresses the main concerns with harvesting and storage (Activity 4). If Acrunet quality standard does not address the slaughter issue, the issue could be explored in Acrunet II. Processing storage for Acrunet II (Activity 6) Q&A and positive story lines (Activity 7) 	

Topic:	Food safety	
Issue:	Biotoxins	
Industry practice:	Occurrence in crabs	
Impacts of industry practice		
	Evidence for concern	Uncertainty
	<ul style="list-style-type: none"> • Biotoxins can pose a risk to human health. • Biotoxins are produced naturally by certain marine micro-algae, and can accumulate in the organs of crabs. • When considering the parts of the crab that are consumed, the highest levels tend to be found in the hepatopancreas (otherwise known as the 'brown meat') and the least in the muscle (white meat) tissue. • It is thought that biotoxins might be denatured or diluted during cooking or processing; however, many toxins are heat-stable, and toxin incidents have been recorded from cooked product. • Crab fisheries have been closed in Scotland and Norway when high levels of biotoxins have been detected in bivalve molluscs. • Few businesses have been recorded as routinely conducting End Product Testing (EPT) on the brown meat for biotoxins in compliance with food safety regulations. • Accumulated levels can pose a risk to human health. • Increased occurrence of documented biotoxins episodes over the past few years. 	<ul style="list-style-type: none"> • The effects of cooking or other processing on biotoxin concentrations have not been fully documented. • The cost to industry of EPT for biotoxins has not been estimated. • There is evidence about biotoxin accumulation, but only research concerning the path of accumulation (food, water, sediment, etc.). Research agenda includes this topic, as well as the effects of climate change on the environment including biotoxins. • How this accumulation will evolve in forthcoming years is unknown. • Precise levels causing risk to human health are unknown; regulatory levels for bivalves often used as reference.
Technical conclusions		
	<ul style="list-style-type: none"> • Lack of regulation about biotoxins in crabs. • White meat levels of biotoxins will not be of concern. 	
Media conclusions		
	<ul style="list-style-type: none"> • The number of articles is stable/decreasing but expected to rise due to European Food Standards Agency decisions, and requirement for national Food Standards Agency guidance • Contaminants are not on the radar yet (as prominent messages are not relevant ?) • When this issue (food safety) is raised it becomes highly negative very quickly; food safety is emotive (a hot potato) and attention decreases slowly (has a long tail). 	
Risks		
	<ul style="list-style-type: none"> • None specified 	
Opportunities		
	<ul style="list-style-type: none"> • None specified 	
Recommended action		
	<ul style="list-style-type: none"> • Promote regulation about biotoxins. The state should be 'the back stop', monitoring the issue to guarantee consumer safety (Activity 2 & 8). 	

Topic:	Food safety
Issue:	Cadmium
Industry practice:	Occurrence in crabs
Impacts of industry practice	
Evidence	Uncertainty
<ul style="list-style-type: none"> • Cadmium is found in both the white and brown meat of brown crab. • Levels lower in white meat for which the EU maximum permissible level is set at 0.5 mg/kg for white meat. • There is no maximum permissible level set for brown meat due to highly variable concentrations (mean 4 mg/kg ww in FSA survey, av 8mg/kg EU survey) and consumption habits; however, the EC recommended that guidance for consumers be issued by each Member State in the EU. (EFSA recommend a tolerable weekly intake [TWI] from all foods of 2.5 µg per kg of body weight). • Few examples of guidance have been issued. 	<ul style="list-style-type: none"> • The contribution of cadmium from crab products in the diet towards the tolerable weekly intake [TWI] is unknown, would be highly variable from person to person and region to region, and cannot be quantified easily. • It is known that brown meat of crab contains selenium and zinc that might counteract the toxicity of cadmium in humans.
Technical conclusions	
<ul style="list-style-type: none"> • Cadmium can pose a risk to human health. It is assimilated poorly into the human body; however, once absorbed, it accumulates mainly in the kidney. It is excreted very slowly, so exposures are cumulative. Effects of acute exposure to cadmium include headache, nausea, vomiting abdominal pain and diarrhoea. The principal effects of <u>long-term</u> oral exposure to cadmium are renal tubular disease in the kidneys. • High levels of cadmium are found in brown meat compared with other sources of protein. • Levels of cadmium in brown meat are usually well above legal limits (average to 12 to 30 ppm). • However, a direct link between brown meat of crab and illness is unlikely to be found. Chronic effects are likely to be long term (50 years) and could be linked with several sources of cadmium besides brown crab. • Cadmium is found in most foodstuffs, especially cereals, potatoes, bread and leafy vegetables. • Most UK consumers are around their Tolerable Weekly Intake (TWI) from these foodstuffs due to amounts consumed. • Consumer exposure could be estimated based on an upper limit of consumption of brown meat (It could be estimated for example using the EU average figure of 4mg/kg cadmium level in brown meat, the TWI consumption each week, a consumer could eat about two kilogram of brown meat in a year, far more than the typical consumption pattern shown by the Market Track Data and reports. • Cadmium is not a blanket threat as industry already separates white meat from brown meat. Attempts to separate the hepatopancreas (main source of contamination) from the roe of the brown crab have proved unsuccessful (economic and technical issues). • Technical solution seems unlikely due to difficulties in separating contaminated organs, either before or after cooking. Furthermore almost all UK crab processors produce a whole cooked product for sale where removing hepatopancreas is virtually impossible. • Industry has investigated other options to prevent contaminated products entering the supply chain e.g. catching area, size of crab. • Other info; eg all health benefits of eating brown meat - omega3 and minerals and vitamins. Link to SAGB datasheet • (Cadmium is likely to be an issue for all crustacean species) 	
Media conclusions	
<ul style="list-style-type: none"> • The number of articles is stable / decreasing, but would be expected to rise following FSA guidance. • Contaminants are not on consumer radar yet (as prominent messages are not relevant?) • When this issue is raised it becomes highly negative very quickly; food safety is emotive (a hot potato), and attention decreases slowly after media spike (has a long tail). 	
Risks	
<ul style="list-style-type: none"> • Other potential contaminants, in addition to cadmium, may create potential threats in the near future (for example; anthropogenic sources, pharmaceutical, plastics and related chemicals (as endocrine disruptors). 	
Opportunities	
<ul style="list-style-type: none"> • Communication issue: brown crab / brown meat can create an easy link in the mind of some consumers. The response can be targeted as there are regional dimensions associated with consumption patterns; for example, southern European countries demand whole crab. 	
Recommended action	
<ul style="list-style-type: none"> • Media messaging ready and waiting to back up any queries (Activity 7) • Industry to understand they may need to change their product offering to a white meat based product (Activity 7) • Industry to help consumer understand circumstances. Positive promotion ("eat white meat" and the associated benefits), not negative approach, ("Don't eat brown meat") (Activity 7) • Undertake independent research demonstrating whether there is an actual causal link between eating brown meat and accumulation of cadmium. 	

Topic:	Labelling
Issue:	On-pack information
Industry practice:	May not be clear to the consumer what is being purchased or it may be open to misinterpretation.
Impacts of industry practice	
Evidence for concern	Uncertainty
<ul style="list-style-type: none"> Species of crab used in crab products is seldom specified. Generic term 'crab' is used widely. Origin of crab used in crab products is seldom specified on the label. Often crab meat is imported. Proportion (%) of crab in the final product may not be specified. Crab flavouring is sometimes used in products rather than crab protein (meat). In the past, products described as 'crab' contained no crab products (eg crab sticks, now surimi). Food service outlets misrepresent their products or the proportion of crab in their products. Limited or inconsistent use of origin descriptors or regional branding on labels 	<ul style="list-style-type: none"> Consumer concern over whether they are served brown crab from the EU in products they purchase is unknown. Level of 'passing off' as crab in food service is unknown.
Technical conclusions	
<ul style="list-style-type: none"> Some labels not following EU legislation (including exact species) Deliberate reengineering of some products that seem to be the same (long term tradition in seafood) Distinction between mislabelling (incomplete information) and misleading (deliberate/fraudulent information) UK has a prevalence of alternative products/processed products The lack of storage information, list of ingredients and allergy advice are the most relevant information missing from crab product labels Brown crab competitors usually reveal inadequate and misleading information about the identification of the product, its prices are similar or even higher than brown crab products, as well as less convenient and less appealing 	
Media conclusions	
<ul style="list-style-type: none"> For the media, this is not a hot topic, but it is growing in interest A large focus on brown crab (80% hit on search word) If the market eats more whole crab, we are less likely to find labelling issues, therefore higher results for the UK makes sense. 	
Risks	
<ul style="list-style-type: none"> Poor understanding of the preferences and needs of consumers regarding labelling. A threat for businesses selling into price sensitive markets (as at risk of product substitution) and compromises consumer reassurance, undermining trust and related supply chain initiatives Threat of limited enforcement of regulation does not incentivise action on labelling (must rely on voluntary industry response) 	
Opportunities	
<ul style="list-style-type: none"> Opportunity to ensure consumers know what they're eating, building trust in product. 	
Recommended action	
<ul style="list-style-type: none"> Produce Q&A for labelling (Activity 7) Opportunity to explore consumer preferences and needs relating to labelling in future Acrunet project (Activity 6 Acrunet II). Apart from the mandatory requirements from the EU legislation, voluntary packaging labels should include the exact crab species name (to distinguish from competitor products), and identify the presence of brown meat content (since contaminants are mostly associated with brown meat, e.g. cadmium) (Activity 2 & 6) 	

Topic:	Stock	
Issue:	Status of the fishable stocks	
Industry practice:	Sustainable management of the fishery	
Impacts of industry practice		
	Evidence	Uncertainty
	<ul style="list-style-type: none"> Crab fisheries are classified as 'data deficient' by MSC. There are attempts to address the data deficiencies in some areas. There are basic management measures in place in all areas (eg MLS; ban on landing soft crabs; ban on landing berried females (egg carrying); restricting the % or weight of unattached claws in the landed catch; ban on using undersized crabs as bait). In other areas, such as France, extra measures such as pot limits are in place. Generally, crab fisheries are open access fisheries for licenced vessels with no effort limitation and no restrictions on fishing method or design. Stock structure, integrity and recruitment mechanisms are poorly understood and little researched, although this is being addressed in some areas. Larger crab vessels are highly mobile and can fish an area down before moving on. New areas are being opened for exploitation by the fishery without assessing the vulnerability of the stocks. 	<ul style="list-style-type: none"> The cost of accumulating data to fill data gaps may be disproportionate to the value of the fishery. It is not known how widely data from one area might be applied to another area when making management decisions.
Technical conclusions		
	<ul style="list-style-type: none"> No quota is in place for crab There is no requirement to record landing data from the under 10m vessels, except in Scotland. Full landing data is not known across the industry Certain stock assessment and methodology can mislead e.g. 2014 MSY assessment of brown crab (based on unsuitable and some cases inadequate data) due to life history characteristics. 	
Media conclusions		
	<ul style="list-style-type: none"> Distinction with other issues, brown crab shares focus with other crab and shellfish Issue for production area media (UK & France) means relatively low media exposure of the issue in Spain Very large number of articles, in particular in 2012 (finalising of CFP?) so suspect lower level of incidents is the norm 	
Risks		
	<ul style="list-style-type: none"> This is an important gap and risk area, where the industry has not got the infrastructure and data to defend their position. Some areas have committed large amounts of resources over the past decade to provide meaningful stock assessments. This good work should not be ignored. 	
Opportunities		
	<ul style="list-style-type: none"> None specified 	
Recommended action		
	<ul style="list-style-type: none"> Find the right common indicators that are to be used across the board (Activity 3). How do new regulations from the discard ban effect the industry? (Activity 3) Explore contribution from quality standard (Activity 4) Produce Q&A for stocks (Activity 7). 	

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ANNEX II (MEDIA REVIEW)