

# project news

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ACRUNET Partner Meeting in Vigo

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## ACRUNET project focuses on innovations in crab transport and packaging

The 4th **ACRUNET** (Atlantic Crab Resource Users Network) partner meeting was hosted by Centro Tecnológico del Mar (CETMAR) at its headquarters overlooking the historic port of Vigo. The meeting was opened by the Managing Director of CETMAR, Paloma Rueda Crespo who welcomed the delegates to Vigo and expressed her support for the **ACRUNET** project.

Most of the partners were represented and the industry members were accompanied by several well-known figures from the crab-fishing sector in France, the United Kingdom and Ireland. The **ACRUNET** ranks have been swelled by the addition of two new partners – the University of Hull or, more precisely, the Institute of Estuarine and Coastal Studies led by Drs Katie Smyth and Roger Uglow, and Marine Scotland Science represented by Carlos Mesquita. The **ACRUNET**

project is delighted to have gained such prominent experts to help it achieve its goals.

**ACRUNET** is scheduled to run for 35 months so this meeting marked the half-way mark. The partners felt it was an appropriate time to review and assess progress to date and, if necessary, adjust strategies and time-scales to ensure a positive outcome for the widest possible spectrum of the brown crab industry. As usual, the first day was devoted to in-depth focus group meetings arranged around the project Activities; characterising the brown crab industry, developing a pan-European standard and improving the transport of live crab were among the topics dealt with.

However, the main gist of this meeting reflected the current thrust of the work being carried out by Activity 6 - the introduction of innovative technologies and practices – which takes a very broad approach to the challenges posed by transporting and marketing a unique item such as a crab. Through a series of Actions, this Activity looks at various transport options, the wide range of packaging materials and, ultimately, waste utilisation. The partners involved in the transport Actions are primarily Bord Iascaigh Mhara (John Fagan) and the University of Hull (Roger Uglow and Katie Smyth). Their initial results and planned work in the near future are detailed in “Vivier Holding Systems and Transport” (pg 2). In parallel, **ACRUNET**'s Portuguese partner, the Portuguese Institute for the Sea and Atmosphere, led by António Marques, has compiled a comprehensive overview (see “Brown crab packaging available to consumers: current status and perspectives”, pg 4) of the wide variety of packaging in which brown crab, and its competitor products, are presented to the consumer. The final Action, namely waste utilization, will be reported fully in a future edition of **ACRUNET** Project news.

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Other outputs from the meeting included the data gathered by SeaFish with its research in the target countries which threw up some interesting trends and issues; this is an on-going Activity which ties in with the educational and promotional material being developed by FranceAgriMer displayed in Vigo.

There was an extensive debate on management issues, in particular the difficult problem of latent capacity which

concluded with a proposal to hold a specific management-issues meeting between the science-based partners and industry representatives in Dublin in early 2014.

The next meeting of the **ACRUNET** partner organisations will be hosted by the Scottish Fishermen's Federation in Edinburgh on 11th and 12th March 2014. Agenda and further details will be confirmed.

## Vivier holding systems and transport

The existing brown crab industry has developed very largely as a result of the introduction of vivier holding systems and transport. Dedicated vessels, some in excess of 25 metres, are equipped with seawater-filled holds which can keep crustacean animals alive and in excellent condition for relatively long periods. Trucks are similarly equipped with seawater tanks and chilling facilities to transport catches to processors or land-based holding systems. However, every step in this chain contributes to deterioration in quality and varying levels of mortality. **ACRUNET** Activity 6 aims to assess these steps and identify areas for improvement.

### Vivier transport assessment

*John Fagan, Bord Iascaigh Mhara*

As part of Activity 6, Irish and UK partners have been examining transport chains from vessel to bulk-holding facilities in order to gather baseline information for commercial practice. Partners from Hull University and BIM followed product from an Irish vivier vessel from Rathmullan (Donegal) to Roscoff (France) in early September and examined numerous physical and chemical

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Vivier Truck Transport



Measuring Internal Crab Temperature



Vivier Holding System in France



The Transport Monitoring Team  
*John Fagan, Roger Uglow and Katie Smyth*

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Crab Discharged to Holding Tank

quality markers during transport. Initial trials involved recording water and air temperatures and blood samples during vivier vessel unloading, temperature salinity and blood samples during loading into refrigerated lorry and upon arrival in Roscoff and temperature, salinity and blood samples one hour after loading into seawater ponds in the holding facility in Roscoff. Initial results indicated low mortality on arrival in Roscoff however higher mortalities the following day.

A series of follow-up trials will be developed in first quarter of 2014 to gather further baseline data for commercial practice at additional bulk storage facilities in France, Spain and Portugal. This baseline data will provide comparative data to benchmark later technological adaptations to include variable stocking densities in tanks (crab to water) and cascade systems (water versus spray systems). The aim of these trials will be to examine feasibility of adjusting commercial transport practice for bulk transport systems in comparisons to incremental improvements which might be incorporated to existing processes.

## Crab quality issues during transport

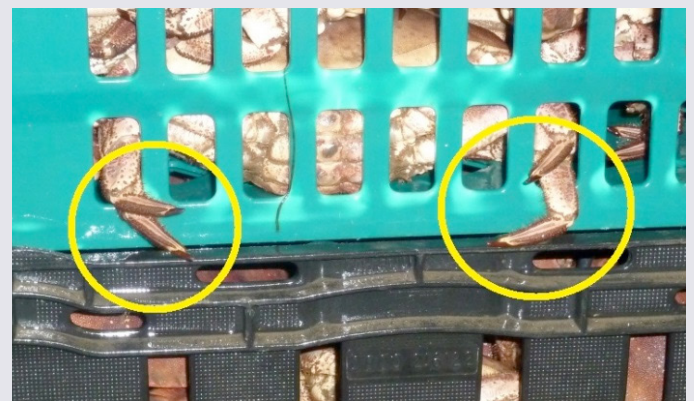
*Dr Roger Uglow and Dr Katie Smyth,  
University of Hull*

We joined the project in July 2013 and our intentions are: 'To improve the results of current supply chains of live brown crab and make them more cost-effective'. This involves a close examination of the procedures used and their effects on the crabs in terms of their quality maintenance and to come up with more appropriate alternatives.

Our initial studies have been to examine the early segments of current supply chains so that we have a clear idea of problems and results. This relates principally to crabs destined mainly for France and Spain but also with some being sent to the Far East. We have attempted to cover the principal regions where significant volumes of brown crab are landed and obtain a representation of long and short journeys, using a questionnaire in addition to visits. Some inspections still needed of the fisheries in the South and South West of the UK. These studies will continue for some months. We have monitored loading, unloading and packing procedures and, in the New Year, will extend these studies to continental equivalent activities.

### Initial impressions include:

- Widespread use of inappropriate procedures and boxware (**Fig. 1**) resulting in a proportion of the crabs becoming physically damaged and prolonging loading/unloading/packing.
- Holding and transportation temperatures are often too high and result in high water ammonia levels.
- Crabs are handled too often resulting in some becoming damaged and prolonging loading/unloading and costing time.
- Ice packs often packed with the crabs consigned 'dry' in polystyrene boxes. Non-chilled crabs act like hot water bottles, warm the interior of the box and melt the ice packs rapidly. This heat cannot escape a thermal box so is retained.



**Fig. 1**

Crabs wrap their legs around inappropriate box ware. Legs can get ripped off when crabs are unpacked.

About 25 years ago, when the trade was young, Roger and a colleague (Debbie Hosie) examined thousands of crabs at first landing and on arrival at French and Spanish facilities. Damage such as broken and missing leg tips, legs and claws was recorded, and whether it was recent or old (**Figs 2 and 3**). We are currently following up this work, making similar studies of current damage to crabs as we suspect procedures and damage levels have not changed in the intervening time. 25 years ago, animals 'dead on arrival' had a 4 : 1 ratio of damaged : intact. We intend to report on our follow up to these results at the Edinburgh meeting.

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**Fig. 2** Old injury



**Fig. 3** Recent injury

Dead crabs decompose rapidly and foul the water in vivier tanks (**Fig. 4**). We have started a series of experiments to measure the extent to which a crab corpse, or cast limbs foul the water that they are in. This will be done at a range of water temperatures and we hope to discuss the results in Edinburgh. In parallel with this work, we are investigating ammonia production in brown crabs. Although it is recognised that ammonia is a substance that impairs shellfish quality, few know any more than that about it. We are currently measuring ammonia production per unit weight of brown crab per hour in seawater temperatures from 5 – 20°C (**Fig. 5**). We will present these data as a user-friendly graph that can be used to judge the conditions that are likely to occur in the supply chain. As the concentration values of ammonia do not mean very much to a non-scientist, we will also produce a simple, explanatory leaflet about ammonia and what to avoid etc. Both the temperature/ammonia production graph and a draft of the ammonia education leaflet will be presented at the Edinburgh meeting for colleagues' opinions.



**Fig. 4** Fouled vivier water during transportation

Next year, we intend to examine the middle phases of the distribution chains – mainly in France and Spain. We are currently awaiting the responses of a number of dealers who have been asked to collaborate in these studies. We

will also be conditioning brown crab and packing them 'dry' to accompany normal vivier consignments to the continent. These innovations will be fully-costed and it is intended to make comparative quality checks on the animals on arrival at continental facilities. 'Dry' distribution systems confer a number of distinct advantages over 'wet' ones (**Fig. 6**) and are already widely used in N. America and New Zealand.



**Fig. 5** Taking samples for ammonia production in simulated vivier transport, 1:1 crab:water.

**Fig. 6**

WET SYSTEMS	DRY SYSTEMS
Payload weight inefficient	Payload weight efficient
Land and sea-based systems only	Land, sea and air-based systems
Inefficient use of payload space	Efficient use of payload space
Needs dedicated vehicle	Does not need a dedicated vehicle
Little possibility of back-loading	Back-loading an option
Pre-packaging impractical	Pre-packaging feasible
Repetitive handling likely	Repetitive handling avoidable
Loading/unloading cumbersome	Loading/unloading simple
Distribution radius ~ 48 – 60h	Global distribution radius
Dependant on seawater carried	Seawater not needed
Part loads/small deliverable impracticable	Part loads/small deliveries practical

### Brown crab packaging available to consumers: current status and perspectives

*Dr António Marques and Dr Amparo Gonçalves, Portuguese Institute for the Sea and Atmosphere (IPMA) (ACRUNET. Activity 6. Action 3. Consumer Packaging)*

Brown crab (*Cancer pagurus*) is widely appreciated in Southern European countries, where it is consumed all year around, but particularly in summer months and in December during Christmas and New Year festivities. The muscle, hepatopancreas and gonads are consumed separately or as a mixture, and larger males are usually more expensive than females and smaller males. Brown crabs are mainly traded in two forms: live or processed. Generally, in Southern Europe traditional and older consumers prefer to buy live crabs and prepare them at home, whereas younger consumers prefer to eat brown crab at restaurants or to buy processed products, since they have limited time available or skills to do such preparation. Live crab trade has several disadvantages compared to that of processed crab products, such as shelf-life, transport conditions and costs and quality maintenance. Fortunately, in modern society, brown crab consumers' behaviour is changing with a shift towards ready-to-eat processed products due to lack of time to prepare meals at home.

Processed brown crab is sold in a diversity of more or less appealing and environmentally-friendly packaging formats. Older and some young consumers of brown crab are still reluctant to shift to processed products due to several reasons, namely the lack of consistency in quality and different perceived attributes. Therefore, the brown crab

processing industry is highly interested to understand consumers' needs and the reasons for such resistance in order to implement strategies to overcome these obstacles. In this way, Activity 6 of the **ACRUNET** project, led by Dr António Marques of the Instituto Português do Mar e da Atmosfera (IPMA, I.P.) in Portugal, is surveying in Action 3 (responsible: Amparo Gonçalves, IPMA I.P.) the different consumer packaging formats used to sell processed brown crab throughout Europe. Additionally, competitor crustacean products are being also identified and characterized. A harmonized consumer sensorial sheet was developed to assess different parameters (e.g. emotional appealing, convenience, visibility) in the different products available in retail and wholesale markets of UK, Ireland,



Examples of chilled processed brown crab products available in Ireland and UK.

France, Spain and Portugal. So far, the assessment of processed brown crab products and competitor species available in the different European markets is underway in the UK (65 products), Ireland (9 products), France

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..... Examples of competitor crab products available in European markets.

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(collecting samples), Spain (7 products) and Portugal (11 products). The sampling will be concluded by the end of the year and a report prepared in the first trimester of 2014. Interestingly, so far, Irish and UK products revealed higher proportion of canned and chilled processed meat of brown crab, whereas in Portugal and Spain whole processed frozen crab had predominance over other products (see below photos of products assessed in the different countries).

The results will enable **ACRUNET** to identify the weaknesses and strengths of each crab product that ultimately will lead to the characterization of the best presentations and quality for processed brown crab products to be implemented by the industry in the different countries (with input from the consumer market study undergoing in Activity 5 led by Angus Garret, SEAFISH). Feasibility studies will support the conclusions for the implementation of innovative products and transport in convenient packaging formats. At the end of 2014 a workshop will be organized to present the results obtained to the partners and brown crab processors.



..... Examples of frozen processed brown crab products available in UK, Spain and Portugal

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