Mutual interests of science and industry in data collected during processing of edible crabs (*Cancer pagurus*).

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**Summary**

The edible crab, *Cancer pagurus*, is an important commercial species for small vessels along the Norwegian coast. In central to northern Norway one producer handles most of the landed crabs. In this factory the meat (hepatopancreas and gonad) content of female crabs are checked using a Near Infra-Red scanner that separates production crabs from good quality consumption crabs. Recently the factory has started to register these meat content data, aiming to better understand how quality varies with season and geographical location. In analysing these data and correlating the values with somatic indices, we have found that the scanner also has the potential to identify female crabs with high roe content, i.e. females in a late gonad developmental stage. We present some results from these preliminary investigations and discuss the potential use of such industry data in gaining a better understanding of the species’ biology.

**Introduction**

With 5000-6000 tons landed annually, the fishery for edible crab has become one of the most important fisheries for small Norwegian fishing vessels. The fishery is distributed along the whole coast of Norway, but with the majority of crabs fished and landed in statistical Area 07 and 06 (Woll et al., 2006) (Figure 1). Within these areas, most of the fishers deliver their crabs to local landing facilities that further ship the crabs to one factory for processing. In order to separate crabs with poor quality from crabs with high meat content, the factory scans all female crabs using a Near-Infrared (NIR) scanner (Wold et al., 2010). Through years of production, the factory has experienced that the frequency of good quality crabs varies seasonally, annually and between areas. To better understand these spatio-temporal differences the factory now aims to establish a system that automatically stores data on quality from the NIR-scanner and relate these to season and origin of catch. Initial registrations have been conducted, and we here present some results from these investigations where we also have identified the potential use of these data to monitor the timing and frequency of gonad development in *Cancer pagurus* in different areas.

**Material and Methods**

Quality of crabs was registered from two statistical areas (Area 06 and Area 07, Figure 1) through the season of 2013 by conducting weekly NIR-scans of 300-400 crabs. The proportion of crabs with high meat content (defined by industry as superior crabs (NIR>34)) was then calculated. To confirm the accuracy of the NIR-scanner and the classification of superior crabs we compared a range of NIR-values with gonad index of 150 crabs. The Pearson correlation coefficient was calculated to determine the relationship between the gonad index and NIR values.
Results and Discussion

Figure 2 – Relationship between measured NIR value and gonad index of 150 crabs. Gonad index calculated as gonad weight × 100/carapace width². NIR values above 34 (vertical dotted line) is classified as superior crabs in production.

The NIR-scanner for measuring quality of crabs is calibrated to measure the total meat filling (hepatopancreas and gonad) of the crabs carapace (Wold et al., 2010). As expected the best relationship with NIR-values was therefore found when correlating these values with indices of total meat content (r=0.85, p<0.001). However, a significant and positive correlation was also found when comparing gonad indices with the measured NIR-values (Figure 2), indicating that the amount of gonads is very much determinable for high NIR-values. A few crabs were found to have very low gonad indices when yielding high NIR-values, and were identified to have a very high liver content. However, Wold et al (2010) showed that it is possible to make calibrations for roe and liver separately. Thus, with slight modifications to the instrument it will be possible develop a system that with higher accuracy is able to single out crabs with high gonad indices.

Weekly registrations of NIR values from Areas 06 and 07 are shown in Figure 3. A similar development is observed in the two areas, with rising frequency of superior crabs from the beginning of August. The increase in frequency of quality crabs was however slower for the more northern Area 6, which also appeared to still be rising during the period when the frequency of quality crabs in Area 7 was declining. This is also reported by the industry, which through years of processing crabs, has experienced a delayed quality development with increasing latitude. Assuming a close relationship between high NIR-values and gonad index, this indicates that there is a difference in the timing of gonad development in different areas, and that there is a potential for using these data in biological studies. Over 3000 tonnes of crabs are processed by the factory each year, where information on date of catch and location is available. Thus, through establishing a cooperation with industry, large data sets can become available for investigations on geographical, seasonal and inter-annual variability in gonad development. By combining these data with information related to reproduction collected by our reference fleet of crab fishers (frequency of soft crabs and ovigerous females), temporal and spatial differences in the reproductive biology of the crab may be better understood. Knowledge on spatial and seasonal differences in quality and frequency of unwanted soft crabs is also of great interest to the industry, who can use this information in planning and organizing fisheries activity and production.

References
