

Capture induced stress and live storage of Atlantic cod (*Gadus morhua*) caught by trawl: Consequences for the flesh quality

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Highlights

- Both haul size and haul duration influenced the blood pH, lactate and muscle pH.
- The survival of cod decreased during live storage with longer haul duration and larger haul size.
- The commercial slaughter method (direct gutting) resulted in increased discoloration of the muscle.
- The time spent from capture until bleeding is crucial for the exsanguination.
- The muscle quality of 6 h live storage cod was significantly improved.

Abstract

Stress associated with commercial trawling of Atlantic cod was evaluated together with the effects of live storage (0, 3 and 6 h) on the blood pH, glucose, lactate, muscle pH, and mortality. Additionally, the commercial method of direct gutting, used to process fish on-board, was compared to live storage fish that was percussively killed, bled by throat cutting and exsanguinated for 30 min prior to gutting. Visual quality defects related to capture, such as discoloration, net marks and blood spots were evaluated both on whole fish and fillets. The haul duration influenced the survival rate (mean $\pm$ SD: $73.2 \pm 19.6\%$), elevated the lactate levels (mean $\pm$ SD: 5.22 ± 2.54 mmol L⁻¹) and declined the blood pH (mean $\pm$ SD: 7.05 ± 0.16) and muscle pH (6.97 ± 0.16). The hauls with the highest mortality, the lowest initial blood pH (mean $\pm$ SD: 7.05 ± 0.16 ; $P < 0.05$) and the ones that showed an elevated blood lactate (mean $\pm$ SD: 5.22 ± 2.54 mmol L⁻¹; $P < 0.05$), were the longest hauls in duration (>5 h) and had the highest catch (>10 tonnes). The fish recovered during live storage, but the haul size and duration influenced the blood and muscle pH significantly even after 6 h. After slaughter, it was observed that 52% of examined fish had catch related damages; red discoloration, net markings and skin scratches. The commercial processing method resulted in a significant ($P < 0.05$) increased in muscle discoloration, compared to fish that was bled immediately. The 3 h live storage increased the muscle discoloration significantly ($P < 0.05$). However, after 6 h live storage, most of the red discoloration was removed and the fillets were considerable lighter. This clearly shows that fish are able to redistribute blood from the white muscle during recovery and that the haul duration influenced the mortality, muscle and blood chemistry. Thus, the time from capture to bleeding and recovery are important factors in order to improve flesh colour of trawl caught cod.