Safety and efficacy results after vaccination of cod (Gadus Morhua) with ALPHA MARINE Vibject
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Introduction
Farming of Atlantic cod is a growing industry in Norway and a sustainable farming of cod is important to meet the demand of a safer seafood. Disease control measures can significantly reduce the economic losses and improve the safety of the seafood supply. However, the effects of vaccination on the fish are limited by a lack of immune memory. Once an immune response is induced, the initiating stimulus is removed and therefore, the immune system is not provided with a continuous antigenic stimulus. Vaccines are designed to induce long-term protection against disease. The vaccine is an oil-based vaccine, encapsulated in the abdominal cavity. The presence of adhesions between the organs and the abdominal cavity is recorded mainly between the intestines, pyloric caeca and the organs and peritoneal wall are not common and the development of pigmentation on organs and in muscle is practically none existent in cod.

Laboratory studies
The laboratory studies have been performed at commercial farms. The fish vaccinated with ALPHA MARINE Vibject and the control group vaccinated with ALPHA MARINE Vibject (water-based vaccine) were vaccinated with the recommended dose and challenged with Vibrio salmonicida in 3 trials at 6 months post vaccination. The fish was vaccinated from 1 to 15 months.

Field trials
The field trials have been performed at commercial farms. The fish vaccinated with ALPHA MARINE Vibject and the control group vaccinated with ALPHA MARINE Vibject (water-based vaccine) were vaccinated with the recommended dose and challenged with Vibrio salmonicida in 3 trials at 6 months post vaccination. The fish was vaccinated from 1 to 15 months.

Conclusions safety
1. ALPHA MARINE® Vibject does not cause any abnormal behavior or toxic reactions in cod vaccinated at >30 grams.
2. The side effects recorded up to 18 months post vaccination with ALPHA MARINE Vibject were low and at an acceptable level.

Efficacy results
1. Field trials
A. ALPHA MARINE Vibject has been tested in 2 laboratory studies using five groups vaccinated with three different batches of ALPHA MARINE® Vibject and the control group was vaccinated with ALPHA MARINE Vibrio (water-based vaccine) at different commercial conditions. The results from triplicates confirmed the safety profile and immunogenicity obtained from controlled laboratory studies with ALPHA MARINE Vibject.

2. Field trials
The field studies have been performed at commercial farms. The fish vaccinated with ALPHA MARINE Vibject and the control group vaccinated with ALPHA MARINE Vibject (water-based vaccine) were vaccinated with the recommended dose and challenged with Vibrio salmonicida in 3 trials at 6 months post vaccination. The fish was vaccinated from 1 to 15 months.

Table 3: Summary of side effects recorded in all field trial in performance with ALPHA MARINE® Vibject

<table>
<thead>
<tr>
<th>Safety results</th>
<th>Efficacy results</th>
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<tr>
<td>Vaccines residues 12 weeks post vaccination - single dose</td>
<td>No residual vaccine.</td>
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