A CASE CONTROL STUDY OF JAW DEFORMITY IN SALMO SALAR IN CHILE

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I. INTRODUCTION

Chile is the second world producer of cultivated *Salmo salar*. Exotic and endemic diseases out of control may affect competitiveness of salmon production. Therefore, disease control is a major priority for salmon industry. Fishes with an evident deformity in the lower jaw (Jaw Deformity, JD), started to be reported from the beginning of 1998 in different sites in the country. This problem has not being reported in Chile before. Similar cases has been reported in Scotland (Bruno, 1980) and in Ireland (Quigley, 1995) but these cases were a focused problem affecting few groups and sites. Since 1990, deformities in *Salmo salar* in Norway have been reported, mainly in column and less important in jaw (Baeverfjord, 1998). Many hypotheses have been stated for deformities, but nothing conclusive. In order to know more about the problem in Chile an epidemiology project has been started. Preliminary results are presented in this paper. First, a view of the problem in the country in order to know the magnitude, location and type of site affected. Second, a case and control study to identify some risk factors associated to the presence of the disease. Finally, a characterisation of JD presentation and some of its impacts are presented.

II. MATERIAL AND METHODS

2.1. General study in Chile

A simple questionnaire was sent to all the salmon companies of the country (36) to identify the presence of JD in their sites. JD positive site was defined as the presence of JD in fishes in a frequency considered not normal.

2.2. Case and control study

A sample of 108 *Salmo salar* groups (18 millions of fishes), belonging to 40 seawater sites and 22 salmon industries, were included in the study representing all the ecological areas. The groups were divided into JD positive and JD negative, based on the presence or absence of at least one fish with JD. Putative risk factors, such as group characteristics, management measures in fresh and seawater sites and frequency of other diseases were investigated. A survey was designed and sent to salmon companies to be filled from their own data. The JD positive group was defined as at least one fish with JD.

2.3. Characterisation of the JD problem

Positive groups to JD in case control study were characterised in terms of intra group prevalence and the impacts in productivity.

III. RESULTS AND DISCUSION

3.1. General study in Chile

JD was present in all the country and in all ecological areas (Table 1). JD was more frequent in sea sites, including stuarios, although also was found in fresh water sites. Nevertheless JD were found in 25% of sea sites, 75% of companies had at least one positive site to JD.

Type of site	Total sites	Percentage	Total positive sites	Percentage	Total negative sites	Percentage
Fresh water	60	22.5%	9	15.0%	51	85.0%
Estuary water	19	7.1%	8	42.1%	11	57.9%
Sea water	188	70.4%	47	25.0%	141	75.0%
Total	**267**	**100.0%**	**64**	**24.0%**	**203**	**76.0%**

Table 1: JD situation by type of sites in Chile

3.2. Case and control study

The factors found associated with the presence of JD in groups were imported eggs (OR=5.27 (95% C.I., 2.15-12.67), spring and summer season of entrance to sea water (OR=3.5 (95% C.I., 1.39-8.9), one of the five types of food given in fresh water (OR=9.54 (95% C.I., 1.21-75.21). Average temperature in hatchery was significative ($p<0.05\%$) superior in affected group from April 1997 to July 1998 in more than one Celsius grade ($8,79^{o}$ to $9,84^{o}$). See Figure 1. No differences were found in terms of average age of entrance, average weight of entrance, diseases present in fresh and seawater, temperature in fresh water and seawater.

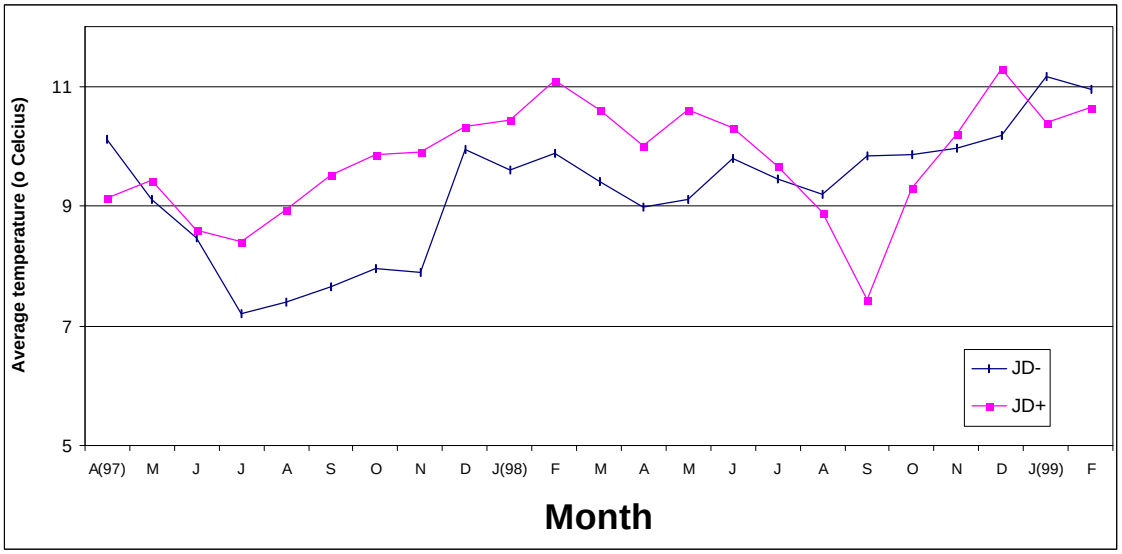

Figure 1: Average temperature in hatchery comparing JD status

3.3. Characterisation of the JD problem

Preliminary results showed that fishes with JD were seen primarily in the first five months in seawater phase (70%). Cases of JD in fresh water were reported in low frequency (less than 10%). Intra-group prevalence, including all JD positive groups, had a tendency to increment from the beginning of 1999 (Figure 2). Intra-group average prevalence of JD in the affected period was 23% and value varied considerably among groups (0.1% to 35%). This indicator increased from the first month up to the seventh month and then diminished (Figure 3).

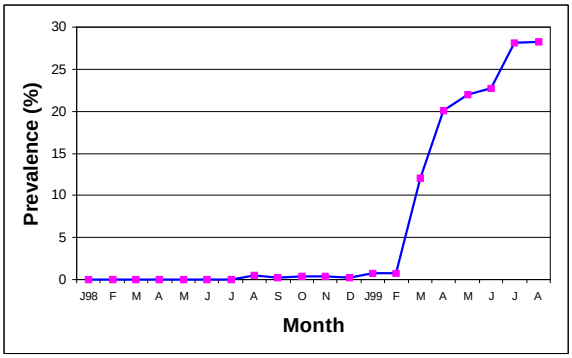

Figure 2 Intra-group average prevalence during the study period

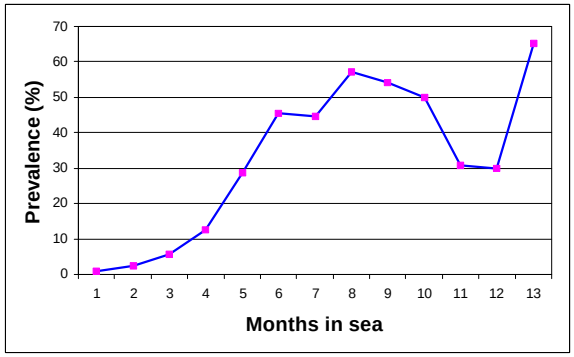

Figure 3 Intra-group prevalence after entering to the sea

JD generated impact in productivity. Principals indicators were affected in the first 7 months in sea water: Mortality rate (57%), feed conversion rate (35.5%) and average weight during the sea phase (25.9%).

Preliminary results will allowed establishing better hypothesis of the cause or causes of Jaw Deformity. Factors found associated to JD and other information of the presentation of the disease suggest a multi factorial problem. Results contribute in focused future research.

IV. REFERENCES

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