



Deliverable Report

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Objective: The objective of this Deliverable was to provide downloadable documentation for the general public.

Description: a promotional video including all the presentations of the six species leaders during the Special Session day of DIVERSIFY at the Aquaculture Europe 2015 conference held in Rotterdam, last October. The Special Session was entitled “New/emerging finfish species (EU Diversify project)” and was organized in the order of the species’ work in the DOW. The session opened with a summary presentation for DIVERSIFY, given by the PC of the project (*Deliverable 31.9 Annual presentation of DIVERSIFY (Y2) at a relevant conference*).

After this, each of the six Species Leaders summary presentations was described. Species leaders and other scientist of the same institutions involved in specific tasks of the DOW, presented the most relevant results of their work. The video shows a summary of the presentations of each of the DIVERSIFY species, highlighting the main findings and results achieved during the first 18 months of the project.

The video has been uploaded in the DIVERSIFY web and in Youtube (<http://www.diversifyfish.eu/news> ; https://www.youtube.com/watch?v=I_JTnaPskK8)

The first species summary was for **meagre (Fig. 1)**. The presentation contained the results obtained during 2014 and 2015 in the scientific disciplines of Reproduction & Genetics, Nutrition, Larval Husbandry, Grow out Husbandry and Fish Health. The main results in **Reproduction & Genetics** have been the complete description of the genetic variability of the broodstock populations from DIVERSIFY partners and other non-DIVERSIFY commercial operations, in the Mediterranean region. The broodstock come from three main origins: Spain, France and the Aegean sea. Likewise, it was shown that meagre can respond to repeated hormonal therapies for the induction of spawning, and a method has been developed for the hormonal induction during 17 consecutive weeks of the same female and for the pair mating of specific females with weekly changes of males, in order to produce large numbers of families for the implementation of future breeding programs.

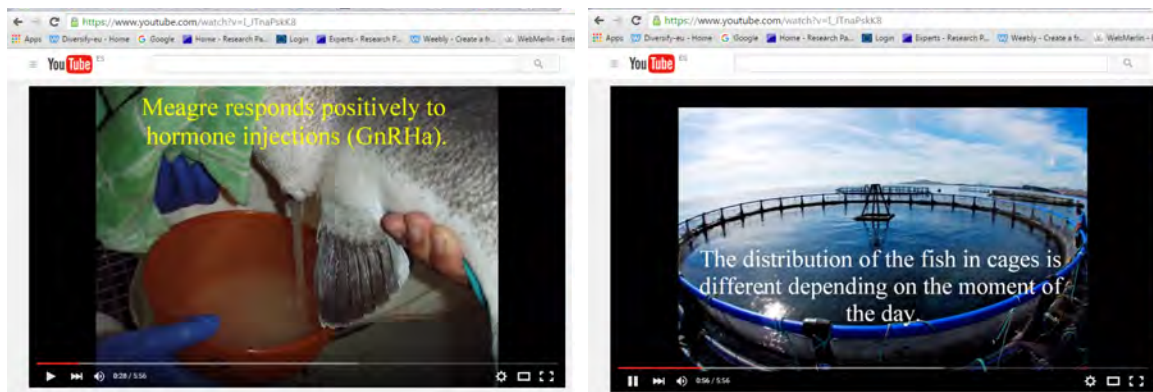


Fig. 1- Desktop captures of the video presenting the results of meagre work

In the area of **Nutrition**, the requirements of n-3 PUFA, vitamin C and E in weaning diets were evaluated, whereas in the area **Larval husbandry** a protocol for early weaning at day 12 under intensive larval rearing conditions has been achieved. In the **Grow out husbandry**, it was confirmed that there is no compensatory growth after grading, so the growth difference among fish classes remain. It has been also observed using echo sounder that the distribution of fish in sea cages is different upon de moment of the day. Concerning **Fish health** the results of several trials carried out in 2015 to understand the relation of nutrition and Systemic Granulomatosis and the evolution of Chronic Erosive Dermatopathy were presented. The use of essential oils as partial replacement of fish oil seems to have beneficial effects on the immune system.

The second species summary presented was for the **greater amberjack (Fig. 2)**. In **Reproduction & Genetics**, a large number (ca. 140) of wild fish has been acquired, to establish 6 broodstock groups, (2 of them in cages). Maturation and egg collection was possible from stocks maintained in sea cages. Gametogenesis, however, in tanks seems to be problematic in the Mediterranean. In the East Atlantic, both spontaneous and induced spawning was achieved with high quality eggs. In **Nutrition**, the requirements during first feeding were studied. The enrichment products were improved. Five levels of DHA were tested for *Artemia* enrichment. The higher content (1-2% DHA) resulted in improved performance and minimum bone malformations while excess levels reduced growth. Different sources and levels of LC-PUFA rich lipids were tested for rotifer enrichment. The results indicated that enrichment using marine lecithin provided the best results compared to the lipid composition of wild fish eggs.

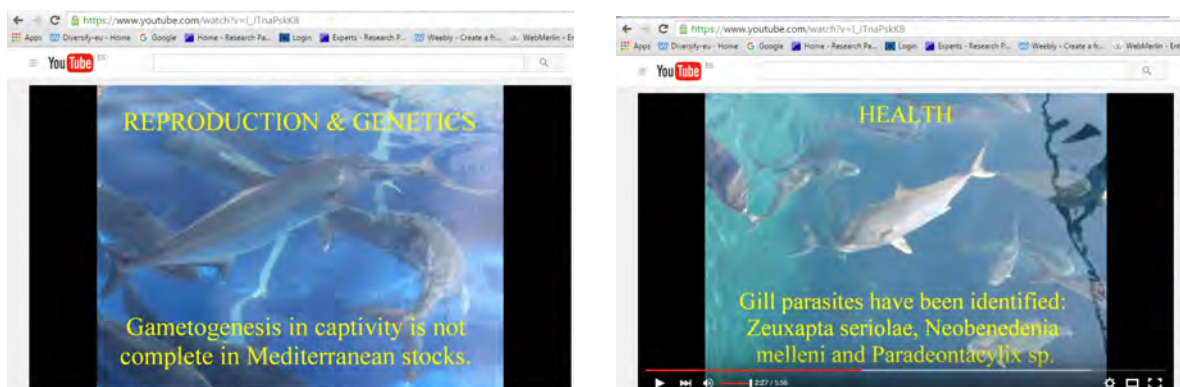


Fig. 2 Desktop captures presenting the advances of the work with great amberjack on Reproduction and Genetics and Health.



In **Larval and Grow out husbandry**, it has been found the optimum egg density for semi-intensive and intensive larval rearing. Experiments were performed to determine optimum larval stocking density and 50 eggs l^{-1} (compared to 25 and 75 eggs l^{-1}) resulted in larger larvae. To define the feeding pattern of juveniles, an experiment comparing different frequencies (1,2,3,4 or 7 meals d^{-1}) was implemented and results showed that with 1 meal d^{-1} significantly lower specific growth rate (SGR) was observed, while feed intake (% bw) was significantly lower with 7 meals d^{-1} . In **Fish health**, gill parasites were identified (the monogeneans *Zeuxapta seriolae* and *Neobenedenia melleni* and the digenean *Paradeontacylix* sp) in the broodstock populations maintained in the cages and tanks, and in the juvenile population reared in sea cages in Greece. Interesting is the finding that increase mucus production via dietary stimulation products seem to reduce parasitic incidence.

The third species summary presented was for pikeperch (**Fig. 3**). With regard to **Reproduction and Genetics**, the genetic variability of wild (8) and captive (13) populations from Tunisia to Finland was characterized using a microsatellite multiplex (11 loci). Two genetically differentiated groups were identified (a northern group and a south-central European group). It was also shown that the captive populations do not suffer from inbreeding. Concerning **Nutrition and Larval husbandry**, the effects of environmental factors (light intensity, water current flow, water renewal rate and timing of tank cleaning) and nutritional factors (quantity of live preys, duration of the weaning period, feeding frequency, co-feeding) on larval rearing were studied.

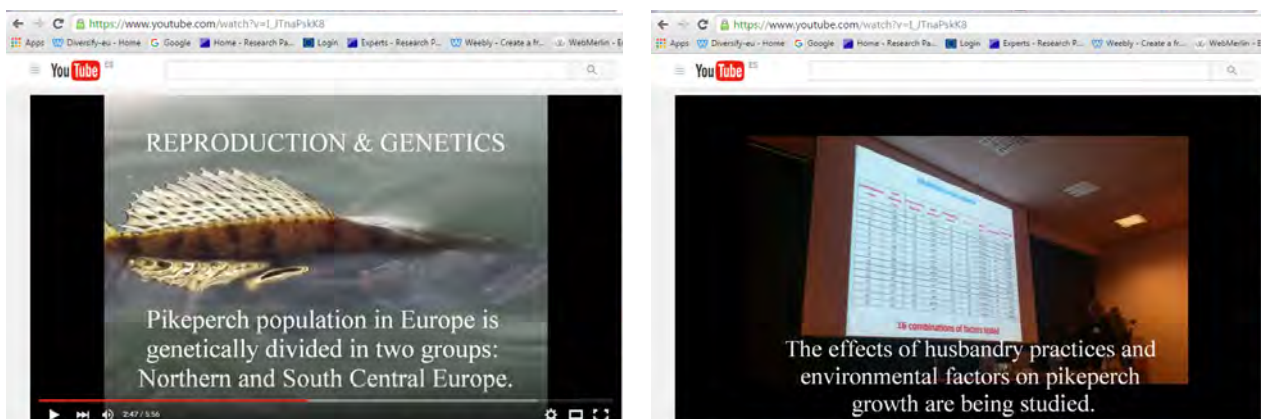


Fig. 3 Video images showing main results of pikeperch work on **Reproduction and Genetics** and the on-going work on **multifactorial analysis of environmental factor effects on juvenile pikeperch growth**.

In **Grow out husbandry** a multifactorial experiment has been realized in order to study the effects of husbandry practices and environmental factors on pikeperch growth, physiological and immune status. The effects of various factors (size grading, fish density, light intensity and spectrum, photoperiod, temperature and diet) and their interactions were determined. At that level, an important objective is to reduce the fish stress and mortality rate. Further processing of the multifactorial experiment results will provide more outcomes in the coming months.

Next species summary presented was for the **Atlantic halibut** (**Fig. 4**). In **Reproduction & Genetics**, pilot trials have been carried out on the implantation with gonadotropin releasing hormone agonist (GnRHa) implants to improve and facilitate egg production in F1/F2 broodstock. The results were not conclusive, but suggested that hormone therapy may be a useful tool to increase egg production in Atlantic halibut broodstock, and synchronizing egg production within a shorted period of time. The work on **Nutrition** and



Larval husbandry in 2105 has focused on development of a protocol for feeding on-grown *Artemia*, and analysis of the nutrient content of *Artemia* nauplii, on-grown *Artemia* and larvae fed either *Artemia* nauplii or on-grown *Artemia*.

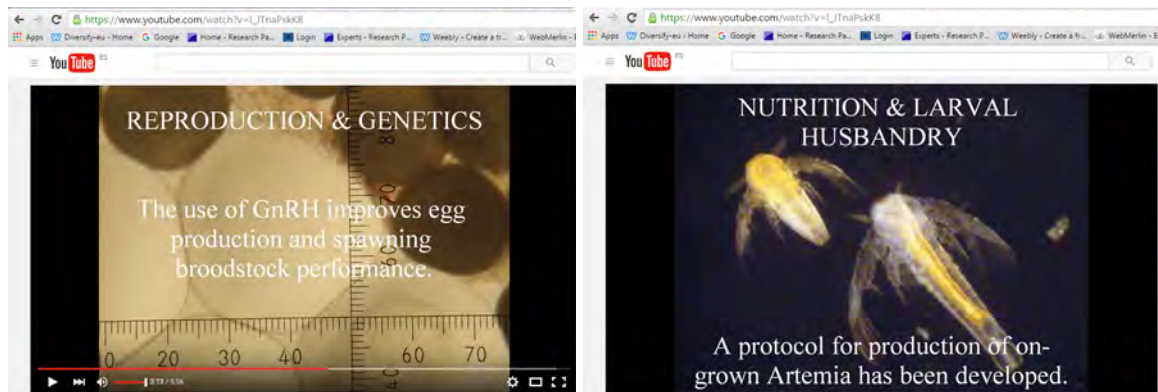


Fig. 4 Desktop captures with the main results of the work done with Atlantic halibut.

In the area of **Fish health**, efirst steps towards developing a vaccine for VNN virus have been developed. The capsid protein present on the VNN virus have been expressed using bacteria (*E. coli*), a protozoan (*L. tarantolae*) and tobacco plant (*N. tabacum*). All systems expressed the capsid, but the protozoan and plant systems need to be optimized.

The fifth species summary presented was **wreckfish (Fig. 5)**. Concerning **Reproduction & Genetics**, the most relevant results were on the description of the reproductive cycle, where both wild-caught animals from the Azores Islands' fisheries and breeders in captivity were studied. Samples from the flesh (muscle), viscera, fins (from wild caught specimens landed in the Vigo Spanish fish market) and morphometric measurements were taken (from all groups). Also blood, sperm and oocytes were taken from the broodstock in captivity. This delivered important information on biochemical composition, reproductive cycle and several habits regarding this species. Laboratory analysis regarding blood steroids and the relation of levels with gonad histology (ovary and testis) development and maturation are being studied.

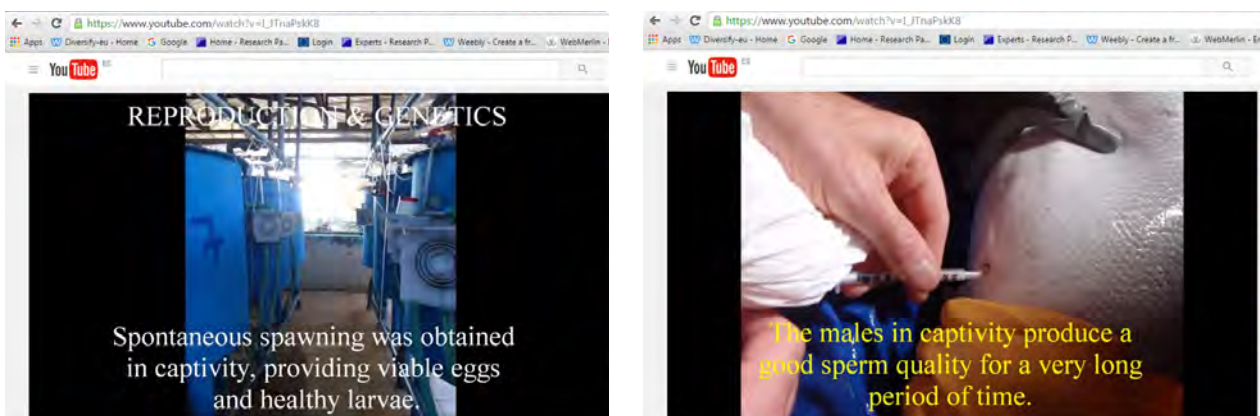


Fig. 5 Video images with results on Reproduction and Genetics of wreckfish.



Spontaneous spawning was obtained in captivity, producing viable eggs and larvae, which were cultured up to 20 days post-hatching. Wreckfish sperm characterization was completed, determining biochemical composition, density, motility characteristics and duration using a Computer Assisted Sperm Analysis system, validated for wreckfish sperm. Sperm cryopreservation was tested, in order to establish an *in vitro* fertilization protocol, as it seems that in most situations wreckfish females undergo maturation and ovulation, but they fail to have reliable spawning in captivity, with poor egg quality. A specific broodstock diet was designed, based on information obtained from the biochemical composition of wild caught specimens. A commercial company produced the diet. The feed is now available for any wreckfish farmer and will be used in the coming years.

The sixth species summary that was presented was for the **grey mullet (Fig. 6)**. Establishment of a Computer Assisted Sperm Analysis (CASA) for the evaluation of grey mullet sperm was one of the first achievements in the area of **Reproduction & Genetics**.

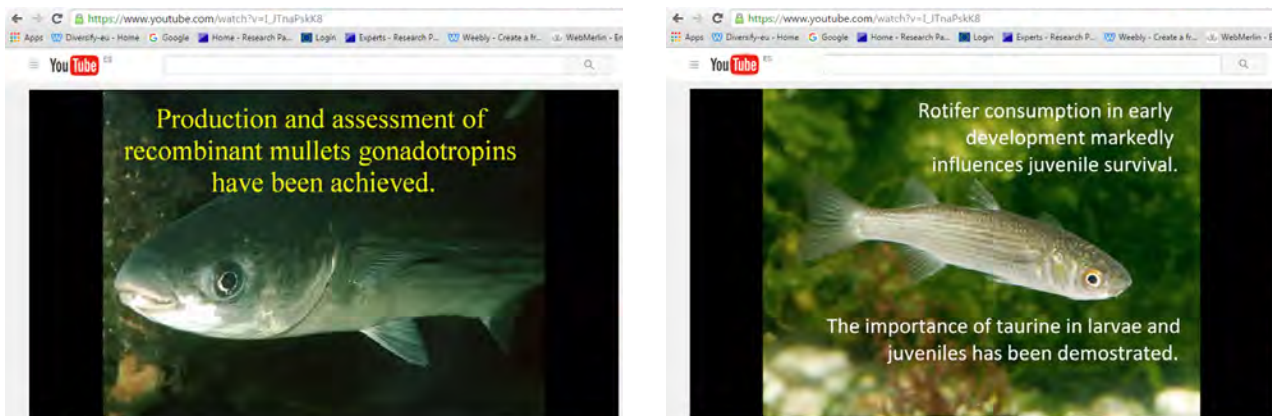


Fig. 6 Desktop capture with major advances in Reproduction and Genetics, and in Larviculture of grey mullet.

In the area of **Nutrition**, the effect of dietary taurine on the performance of grey mullet larvae and juveniles was investigated in relation to developmental stage and the shift of grey mullet larvae from carnivory to herbivory. In a study with juvenile grey mullet (ca 5.5 g) were fed prepared diets that were identical in lipid, protein and micronutrient composition, but differed in their taurine levels for a period of 60 days. Dietary taurine supplementation in juvenile mullet continued to give a growth advantage.

In the area of **Larval husbandry**, the effect of “greening” larval rearing tanks with one of two different algal species (*Nannochloropsis oculata* or *Isochrysis galbana*) at different turbidities and its consequent effect on prey capture was investigated. In the area of **Grow out husbandry**, a large multi-partner (Israel, Greece and Spain) 1 year study is currently underway evaluating the performance of an improved mullet grow-out diet, in monoculture as a function of stocking density and pond type.

The last part of the DIVERSIFY special session was devoted to the presentation of some work done within the Socioeconomic WPs (**Fig. 7**). The first presentation was about the importance of innovation for consumers and for the market. The WP 28-New product development, was addressed with the presentation of Dr. Athanasios Kristallis, and was titled “The time is right for fish production innovation: an exploration of European consumer attitudes towards sustainable new fish product ideas”. The result of this WP has been the elaboration of a catalogue of 41 ideas for new product development, applicable to the DIVERSIFY species.

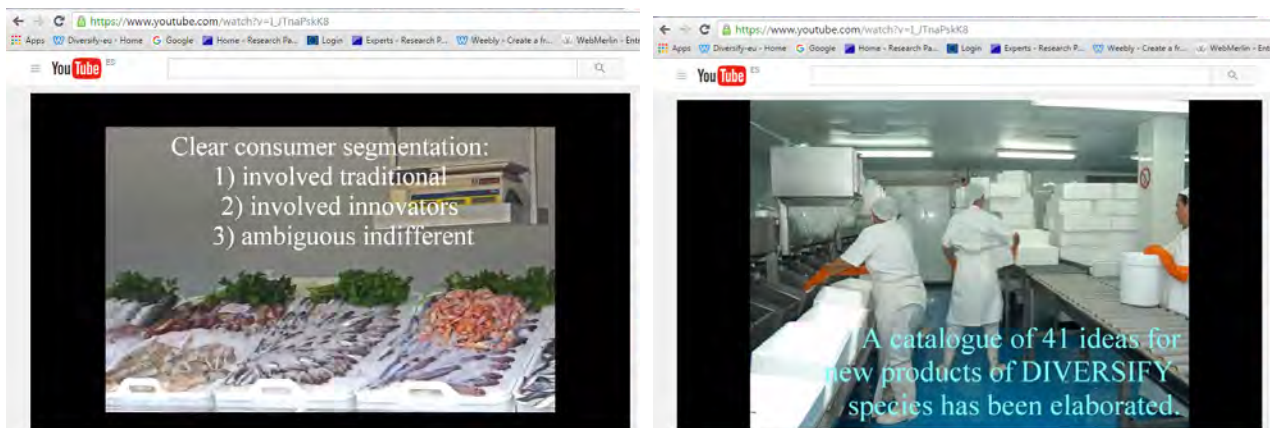


Fig. 7 Video images of the results within the Socioeconomic work packages.

The second presentation remarked on the importance of consumer perception towards new products. The work done during 2015 within WP 29 - Consumer value perceptions and behavioral change was presented by Dr. Machiel Reinders. The presentation was titled “Customer value perceptions towards new farmed fish: European consumer segmentation” and concluded that the consumer segmentation study yielded three groups of consumers: 1) involved traditional, 2) involved innovators and 3) ambiguous indifferent. This study will allow the DIVERSIFY project to target specific market segments and to set the stage for the development of fish products based on new/emerging species for the expansion of the European aquaculture industry.

All the activities are shown in the NEWS section of the project website. Most recent activities appear on the top of the page.

Deviations: No deviations



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