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Akvatek has expanded from a hatchery to a fish on-growing company

A rare producer of white grouper

The aquaculture sector in Turkey has for decades been based on the cultivation of European seabass, gilthead seabream and rainbow trout, and indeed these are still the species that dominate the production statistics. However, in recent years, as companies have gained experience and technologies have matured, what started out as experiments with other Mediterranean and Black Sea fish types are starting to bear fruit.

Species such as meagre (*Argyrosomus regius*), common dentex (*Dentex dentex*), red porgy (*Pagrus pagrus*), red seabream (*Pagrus major*), pink dentex (*Dentex gibbosus*), Black Sea salmon (*Salmo labrax*), bluefin tuna (*Thunnus thynnus*), among others are now being farmed in commercial volumes. One of the companies involved in the production of some of these new species is Akvatek based in Izmir on the west coast of Turkey. The company started out in 1993 as a hatchery for the production of seabass and seabream fry which were sold to other companies for on-growing. Over time the company started producing fry of other species as well - meagre, common dentex, red porgy, and white grouper (*Epinephelus*

aeneus). However, in 2016 the company started on growing fish itself in sea cages for sale on the consumer market. Today, the species it is producing to market size are gilthead seabream, European seabass, meagre, and white grouper.

New markets need to be developed for seabass and seabream

Nedim Yazicioğlu, Coordinator of Akvatek, feels that one of the major issues facing the seabass and seabream sector today is the need to develop new markets. China and Africa are areas with potential, but building markets there will take a concerted effort by individual companies as well as by the sector as a whole, through its association. Currently most of the



Nedim Yazicioğlu, the Coordinator and Gungor Muhtaroglu, the hatchery manager of Akvatek

production is exported to the EU, the United States and Russia, but as he says, the world is big. China, in particular, is a very interesting market, but so far Turkey only has permits to export Black Sea salmon to China, not seabass and seabream.

Akvatek's production of fingerlings is still primarily (about 85%) sold to on-growers, while 3-4 million are used for its own requirements. In 2016, in addition to starting on-growing, the company also began to produce its own fish feed. Currently, this production covers about half its requirement, while the rest is obtained from an external supplier. Mr Yazicioğlu emphasises that the feed production is largely based on Black Sea anchovy meal and oil rather

than vegetable sources, so that the proportion of the beneficial omega-3 fatty acids in the feed and thereby in the fish is also high. However, high quality fish-meal from South Africa and fish oil from Norway are also sometimes used in the production. Akvatek is among the first companies to produce white grouper on a commercial scale. Because it is a very new species to be cultivated the company is only producing enough fingerlings for on-growing itself. The hatchery, which moved to the current site in 2010, is a few meters from the coast and sea water is pumped into the hatchery to breed the fish. The Akvatek hatchery is one of only four hatcheries that get water from the sea in this way, the others retrieve naturally salty water from the ground.



A number of different species of algae are grown in tubes exposed to light. Rotifers eat the algae and in turn are fed on by the fish larvae.



A system of pipes connects the sea cages with a feed barge.



Feed is sailed to the barge and a crane is used to empty one tonne bags into the feeding system.

Low fish prices are a challenge for medium-sized companies

Today Akvatek's market is within Turkey. We have been visiting fairs and speaking with potential clients says Mr Yazicioğlu, but we cannot compete with the prices some of the other Turkish companies are offering. This is a situation that irks European producers, but it is also a problem for companies like Akvatek that have a high quality product and cannot reduce their prices beyond a point. There are a few large producers in Turkey that, because of the high volumes they produce, have a low unit cost of production. But whether the cost of production is low or they are sinking their prices

to gain market share and absorbing losses, Mr Yazicioğlu cannot say. Smaller companies are struggling against the giants as they do not have their deep pockets. For these reasons, Akvatek produces 50% below its current capacity. Another issue however is one of marketing which is inadequate for the volume of fish that is produced in Turkey. Another threat on the horizon is the impact of climate change. Viral and bacterial diseases, parasites, issues brought on by the rising temperature of the Mediterranean Sea, and invasive predatory species are all likely to have an impact on production in the future. Akvatek's site, where the sea cages are located, is in the northern most part of the Aegean Sea, where the water temperature

at 20 or 21 degrees C is slightly lower than the rest of the Mediterranean. The lower temperature prevents diseases, but Mr Yazicioğlu is concerned that they will not stay low for long. The fish are vaccinated against infections and are never given antibiotics, but the threat comes from diseases against which vaccinations have not been developed. The Aegean Sea site is used for the production of seabass which prefers lower temperatures. For the seabream, the company has another site (capacity 1,600 t) in Antalya on the southern coast of Turkey bordering the Mediterranean, where the water temperature is higher and therefore more suitable for the cultivation of this species.

Developing a good product can take over a decade of effort

Gungör Muhtaröğü, a marine biologist responsible for the hatchery, has 35 years of experience in raising fish. He says Akvatek is a boutique producer less interested in volumes than in high quality, a variety of sizes, and a range of species. Some of the fish are grown to a kilo or more as opposed to the more common 300-600 g. Quality starts with the

fingerlings and high quality fingerlings take time to produce, up to a decade, because the broodstock has to be selected, further generations to be produced, and each stage takes three years, then there are practical issues to be solved, such as, permits, construction, feed, staff has to be hired and trained. In the case of grouper it took 12 years to start producing high quality fingerlings, while for seabass and seabream it took 7 years. Production of seabass is higher than seabream as customers typically demand 60-70% of the former and 30-40% of the latter. But growing fish to these large sizes comes with a cost. A one kg seabass normally reaches that size in four years, though at Akvatek that period has been reduced to three years, while a 2 kg fish takes 5 years.

In the hatchery 3% of the 4,000 cubic m of water is changed each hour. This is possible thanks to the use of drum filters, protein skimmers, disinfection with ozone and ultraviolet light, and biological filters, which clean the water before it is recycled. The 3% of new water that enters the system is to compensate for the loss of water through evaporation or from the drum filter. The fish reared in this system are also primed for being



Pressurised air propels the feed into the cages at regular intervals.



Akvatek

The nets need to be taken out of the cages and serviced from time to time.

introduced into the sea. When the fish are put into the sea cages, they are exposed to pathogens that are naturally present in the water. In the hatchery the water is subject to disinfection that reduces the level of these pathogens so that they cannot harm the fish, yet they do trigger the animals' immune systems, so that when put into the sea the fish can cope with the pathogens they are exposed to without falling ill.

Follow nature, but do it cleverly

At the Akvatek hatchery the guiding principle is to do things the way they are done in nature but to use high technology to improve the results. For example, the fish are allowed to grow relatively slowly in order to ensure that both bones and muscles grow in

synchronisation leading to fewer deformities. Feed for the larvae in the form of algae is produced inhouse. About 40 cubic m of space is dedicated to growing algae and every day some 10-20% of the production is harvested. A number of different species of algae are grown as they each have different lipid and protein profiles. Mixtures of different algae species are tested to see which gives the best results with which species of fish. The algae together with rotifers (a microscopic aquatic invertebrate) are introduced into the fish larvae tanks. The rotifers feed on the algae while the fish larvae live off the rotifers. Although rotifers can be used without algae in the larvae tanks, the use of algae has a couple of benefits. It provides the rotifers with nutrition that is beneficial for the larvae, it reduces the

light levels in the tanks so the larvae are more comfortable, and it balances the water quality in the tank. Technicians at three different laboratories monitor the performance of the system analysing

larvae and fish feeds, dealing with pathogens, and keeping an eye on other parameters. A high value product calls for investments in systems and procedures to maintain and improve quality.

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Production: Market-sized seabass, seabream, meagre, white grouper; fish feed

Fingerling production:
25m/year

Species: Seabass, seabream, meagre, common dentex, red porgy, white grouper

Annual production: Seabass, seabream 1,800 t; meagre 100 t; white grouper 50 t

Market: Turkey

Customers: Wholesalers

Employees: 65