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CTI Success Story

Organic caviar thanks to the Lötschberg base tunnel

Sensible use of warm water from the Lötschberg for breeding Siberian sturgeons in an outside basin amply fed with water streaming out of the mountain. In this way undesirable warming of the river Kander can be avoided while at the same time producing a valuable product. The CTI project has already created nine jobs and offers new opportunities to agriculture.

When the engineers came upon warm mountain water while boring the Lötschberg base tunnel, they were not particularly pleased: The water shot out at them at a pressure of 45 bar. The roughly 150 litres of water that has been continuously flowing out of the tunnel every second ever since cannot simply be diverted into the river Kander, since at 18 to 22 degrees Celsius the mountain water would raise the temperature of the river by more than the permitted half degree. From the perspective of the cantonal fisheries inspectorate, this would endanger the brown trout that spawn in the Kander.

Warm water heats a hothouse and an outdoor basin for fish

Cooling the mountain water and using the resulting free energy was the basic thought which led to the idea of a hothouse heated with the mountain water, in which tropical fruits could be cultivated and fish bred. In order for the hothouse to pay for itself over the long term, according to the business plan, a high-yield fish had to be found. That is the sturgeon: its roe, or caviar, is an expensive and sought-after luxury product, and the threatening demise of the fish can only be combated by falling back on products from controlled breeding.

Sturgeon is bred in artificially heated water because its naturally slow growth can be speeded up. In order to save heating energy, the fish breed in closed systems. This, however, lowers water quality and can lead to diseases.



Sturgeons move predominantly on the ground of the body of water: There they also take up their food. Trials in Frutigen have shown that cohabitation with perch works: The perch swim predominantly on top and eat floating food; the sturgeons eat what drifts to the ground – including dead perch. Photo: Tropenhaus Frutigen AG

In Frutigen it was planned to breed the sturgeons in outside basins where the water is changed around three times a day.

A profitable hothouse only with successful sturgeon breeding

Tropenhaus Frutigen AG, a start-up, joined forces with researchers at the University of Bern (Centre for Fish and Wildlife Health FIWI) as part of a CTI project. Over the course of two years they hoped to discover whether Siberian sturgeon could thrive in mountain water. Since very little research has focussed on the sturgeon, other questions had to be answered too. For instance, what conditions does the sturgeon require? How can the sex of the valuable stock be determined with certainty while they are alive? And how can the degree of maturity of the female's eggs before laying – an important factor in caviar quality – be measured? And what alternatives are there to fish-meal, previously used as fish food?

Many pleasing results and still a few open questions

After more than 18 months of research, one thing is certain: sturgeon can be bred in the Berner Oberland. All 1,200 imported young animals have grown and are healthy. Stock densities of up to 60 kilogrammes per cubic metre are possible, but not planned, since production is designed along biological principles. The basin floor must be smooth and thus self-cleaning, because if covered with excrement the sturgeon eating from the base will take up less food and grow slower. Insects could serve as food since with regard to amino and fatty acids they come very close to the sturgeon's natural food. Another interesting possibility would be bee drone larvae: They are in any case separated by beekeepers to fight the varroa mite. However, it has yet to be seen whether beekeepers will be prepared to separate the drone larvae from the wax, and what price they will charge. Researcher Dmitri Pugovkin is not yet completely satisfied with the results of the ultrasound measurement: he believes it should be possible to measure the maturity of the caviar more accurately.

Commercial production planned for 2008

One day, two to three tons of caviar will hopefully be produced annually in Frutigen – a lucrative business bringing in 2,000 Swiss francs a kilogramme. Added to that is annual income of

around 800,000 francs from the sale of sturgeon meat – a product about which René Meyer-Ruffiner of Frutiger Restaurant Rustica is very enthusiastic: "Sturgeon meat is firm, even after cooking, and does not taste fishy – it's more like veal than fish."

Tropenhaus Frutigen AG has already signed a contract for the site of the definitive plant, around two kilometres from the trial station. The construction permit process is next. Frutigen's voters already approved the necessary zoning change in 2005. The support of the Innovation Promotion Agency CTI has also helped the start-up company gain the necessary credibility with investors, says project head Peter Hufschmied, and around 16 million francs in capital has been secured. Wholesaler Coop joined as an important long-term partner at the beginning of 2007; in addition to a few million francs in risk capital, this also provides a welcome distribution channel. Construction is planned to begin in summer 2007, with the commercial production of sturgeon, caviar and various tropical fruits and spices set to start in 2008.

Further Information

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