



# AVOIDING KHV

## WHAT IS KHV?

KHV is an abbreviation for Koi Herpes Virus. KHV is highly infectious and since 1998 has spread rapidly in to countries on at least four continents. During 2006 it was found on 23 fisheries in the UK.

It causes very high mortalities among diseased populations of carp (*Cyprinus carpio*) of any variety – common, ghost or Koi, but not any other species. (more background information is available on pages 3 and 4).

KHV became a notifiable disease in England and Wales on 6<sup>th</sup> April 2007. This means that there is a legal obligation to report it to the authorities when its presence on a site is suspected or confirmed.

It is probably wise to assume any site in the world producing carp might be infected unless they can provide evidence that they are not.

## **WHAT ARE THE SIGNS OF KHV I WILL SEE?**

KHV should be considered as a potential culprit (not the culprit) if:

- Only Carp (*Cyprinus carpio*) including koi, ghosts and common varieties are affected and killed. If other species such as goldfish and grass carp in the same system remain unaffected even if diseased carp are present, then the presence of KHV may be suspected.
- Mortalities occur at water temperatures between 15° and 28° C. If during an outbreak the temperature rises above or falls below this range mortalities may diminish or stop.
- Mortalities are very rapid. Seemingly healthy fish become ill and die in 24-48 hours.
- Very severe mortalities 80-100% mortalities occur within 10 days of disease outbreak.
- Bleeding from the gills (that may also release virus and part account for its' infectious nature).
- White patches, (where excess mucus has been produced or tissue has died) which may be small to very extensive, on the gills or skin.
- Sunken eyes.
- Occasionally fish have shown signs of nervous problems (that is periods of inactivity followed by hyperactive behaviour triggered by a very small stimulant).

The Koi Herpes Virus can suppress a fishes immune system. The body can't then react as it would normally to prevent infections. Thus secondary invasions on bacteria and parasites might be the most obvious problem on an individual fish, but these signs may obscure the damage caused by the virus.

**None of these visual techniques can identify KHV directly but they give very strong indications of its presence. Laboratory tests are used to confirm the presence of KHV (more details page 4).**

## **CAN WE PROTECT OURSELVES?**

### **MAKE SURE YOUR SUPPLIERS KNOW ABOUT KHV**

Ensure that your suppliers are aware of KHV – send them this document. Ensure that they liaise with their government to make sure that they meet any testing requirements placed on them.

No Koi or other carp should be accepted from any unknown source, including retail customers and returned to your holding systems.

### **SELECTION OF SOURCE OF FISH**

If the source of your fish hasn't been infected with KHV then the fish you buy cannot carry the virus. The following criteria and questions might be helpful in formulating enquiries to suppliers:

- Has the site ever been tested for KHV? If so when and what were the results? By whom were the samples selected and collected? Which laboratory undertook the tests using which method – PCR, ELISA, microscopy etc.
- Has the site a protected (fish free) water source such as a well or borehole? Are barriers in place to prevent fish swimming upstream into the site? Does the site flood? What precautions are in place to prevent birds entering the site or dropping live fish into pools on the site?
- Have the fish been mixed with stock from any other source in the supply chain? This is a particularly pertinent question to ask of exporters or importers who consolidate stock from either a wide geographic area or a number of production units. The more stages there are in the supply chain, the more potential for cross contamination if mixing occurs.
- Have any fish been brought onto the suppliers site recently? If so from where, and what measures were taken at those sites to demonstrate freedom from KHV.

### **PREVENTATIVE ACCLIMATISATION**

An acclimatisation period may be used to try to determine if the fish are carrying KHV.

Each batch of fish brought on to a site must be isolated, this is a normal requirement of any good husbandry or stock system. If you require exporters to give assurances as part of the contract of supply, they may require that you provide evidence of an effective isolation policy of new stocks and its effective practical application. Basic records of water quality, mortalities and observations of fish stocks should be maintained and held for reference.

To prevent latent infection remaining undiscovered at some point in the supply chain fish may be subject to a period of "preventative acclimatisation/isolation" of at least 14 days, ideally longer at 23-28 degree C. Any batch of fish in which signs of illness or disease and particularly showing mortalities similar to what this report has called the "calling card" of KHV should be subject to PCR tests. If these prove positive, then that source of supply may be considered unsuitable until adequate remedial action has been undertaken.

Batches from sources of supply might usefully be screened prior to the start of the next coldwater season. To be confident of the results of such screening, the isolation policy must be absolute. Given the apparent infectious nature of the virus in closed

systems no chances of cross contamination should be tolerated if the test results are to be useful.

All water should be discharged via the foul sewerage system.

## **SIZE AND FREQUENCY OF IMPORT CONSIGNMENTS**

The risk of losses may be reduced by importing smaller consignments more frequently than perhaps has been custom in the past. However this may require more investment in isolation facilities.

## **SURVIVORS**

Survivors of an outbreak of KHV should be regarded as carriers of the virus.

## **DISINFECTION**

UV inactivates KHV as does a temperature of 50°C maintained for 1 minute. At 15°C the following are reported in scientific papers as effective:

Disinfectant	Concentration milligram's per litre	Time of exposure-seconds
<b>Iodophore</b> (found in agricultural disinfectants)	200	30
<b>Benzalkonium chloride</b>	60	30
<b>Sodium hypochlorite</b> (often found in domestic household disinfectants)	200	30
<b>30% Ethyl alcohol</b>		30

## **BACKGROUND INFORMATION ON KHV**

### **WHERE DID KHV COME FROM?**

The origin of KHV is unknown. It was first recognised as causing a significant problem at an Israeli ornamental fish farm in the Spring of 1998. However advanced techniques have shown that it was responsible for an outbreak of disease in England in 1996. Where it was lurking before 1996 is for the time being a mystery.

### **HAVE HERPES VIRUSES INCLUDING KHV ANY SPECIAL CHARACTERISTICS THAT I SHOULD KNOW ABOUT?**

In many instances once an animal is infected with a herpes virus, it is infected for life. Herpes Infections are generally characterised as being

- Chronic
- Latent
- Recurrent

KHV is able to remain latent in infected fish for months or years. Disease is only caused when the environmental conditions, in particular temperature, are at an optimum for virus development.

## HOW DOES KHV SPREAD?

KHV appears to be able to survive only for a short time outside the carp it is infecting. The key means of movement is therefore likely to be the carp themselves.

Water, nets, equipment, personnel and other species of fish might transfer the virus but are not as efficient at doing so as live carp. Even so the risk of transmission by these routes should not be ignored.

## WHERE IS KHV FOUND NOW?

<b>America</b>	<b>Europe</b>	<b>Asia</b>	<b>Africa</b>
USA	Austria	China (inc Hong Kong)	South Africa
No	Belgium	Indonesia	
occurrences in	Denmark	Japan	
South America	France	Malaysia	
	Luxembourg	Singapore *	
	The Netherlands	Taiwan	<b>Australia</b> : No
	Poland	Thailand	occurrences
	Switzerland	Israel	reported.
	UK		

\* in fish imported from Malaysia

## LABORATORY TECHNIQUES OF DETECTING KHV

The damage caused by KHV can be detected by using high powered light microscopes and highly specialised electron microscopes.

The tests most widely used to detect KHV are:

- **PCR** – Polymerases Chain Reaction tests: which identify the presence of virus or the remains of dead virus.
- **ELISA** – Enzyme Linked Immuno-Sorbant Assay – this test identifies the presence of chemicals known as antibodies which the fishes body produces in response to infection with KHV.

Neither of these laboratory tests is able to accurately determine the presence of latent virus. Both tests are able to confirm the presence of KHV when symptoms of the disease are present or mortalities have occurred.

Evidence from as many as possible of the methods discussed above should be used when deciding if a site is either infected with or free from KHV.

## WHERE CAN I GET MORE INFORMATION?

On the OATA members login area. Details from the OATA office, 01373 301302, [info@ornamentalfish.org](mailto:info@ornamentalfish.org)