



D N R

Water



F A C T S

Farm dams How to improve water quality

The problems of poor quality water most commonly encountered in farms dams are:

- Turbidity (mud in suspension)
- Chemical and bacterial contamination
- Organic staining
- Reduced oxygen.

Turbidity

Turbidity is caused by very fine particles of clay that remain in suspension in water. This makes the water undesirable as a domestic and stock water supply. It is a separate problem to heavier sand and soil particles, which will settle out in the dam or can be filtered out after pumping.

Treating the source

- ▶ Keep the catchment area well grassed. This will reduce erosion and in turn, the turbidity of runoff to the dam. If it isn't possible to grass the whole catchment, a well grassed entry to the dam will help.
- ▶ Use contour banks in the catchment. They will assist in reducing erosion and consequently turbidity.
- ▶ Keep stock out of the dam and surrounding areas.

Treating the stored water

Water is treated with coagulants which capture and react with fine clay particles causing them to settle out. Alum (hydrated aluminium sulphate), potash alum and filter alum have been used successfully. There are also proprietary products available which have been formulated to settle out turbid water.

When using alum, the pH of the water should be between 6.0 and 7.5. If pH is less than 6.5, it should be adjusted using hydrated lime as described later.

Treat the water in tanks rather than in the dam itself. Large quantities of chemicals are required to treat the whole dam at once. Also dams have a relatively uncontrolled environment compared to enclosed storage tanks, and any runoff into the dam or windy weather following treatment will reduce the effectiveness of the treatment.

Treatment techniques

Three options are considered below:

In tanks: tanks should have two outlets, one near the base to drain off the sludge deposited in the bottom, and a higher one to take off the clear water. Preferably the treatment tank should be concrete or be lined with cement or some other non-corrosive surface.

The table below gives an indication of amounts of filter alum required per 1 000 litres of water.

Very turbid water	Moderately turbid water
100 grams	40 grams

Example: For moderately turbid water in a 4500 litre tank, the amount of filter alum required is :-

$$= \frac{4\ 500 \times 40}{1\ 000} = 180 \text{ grams}$$

Note: 1 000 gallons = 4 546 litres

The above table is a guide only. The correct dosage can also be found by trial and error, by treating a small sample of the water.

Lime will be necessary to counteract any acidity caused by the alum. Lime should be added 4-6 hours after the alum, and at one third of the dosage rate of the alum.

More lime may be required if the water was originally acidic, and less if the water was originally alkaline.

The pH can be tested using a standard swimming pool test kit. Acidic water has a pH less than 7.0. The final pH of the water should be between 6.5 and 8.5.

In dams: The volume of a dam is more difficult to determine. A rough guide is to multiply the surface area (in square metres) by 1/3 of the maximum depth (in metres) by 1000, giving the volume in litres. Quantities of alum to apply can then be calculated. Note as stated before, it is not recommended to treat the dam directly.

Clarifiers: There are commercial clarifiers available which cater for household or small community use. They are fully automatic with chemical feed pumps and sludge removal, but are fairly expensive and only cater for low flow rates. They are usually simple to operate. However, a clarifier cannot be bought "off the shelf". It must be matched by the manufacturer to the quality of the water supply.

Effect of alum treatment

Alum treatment causes settlement of suspended matter only. It will not reduce any chemical or bacteriological contamination of the water.

Chemical and bacterial contamination

Treating the source

Minimising the presence of stock and chemicals and maintaining a clean catchment will reduce contamination. Contour banks, by reducing the severity of the runoff, may reduce the amount of chemicals in the runoff.

Bacterial control

- ▶ The water should be clear and have a pH of about 7.0. Chemicals required to adjust the pH should be used strictly in accordance with the supplier's recommendations particularly in regard to personal safety.
- ▶ Chlorinate using either sodium hypochlorite (liquid), or calcium hypochlorite (powder).
- ▶ As a first trial, add 35 ml of sodium hypochlorite or 1 gram of calcium hypochlorite for each 1 000 litres of water to be treated.
- ▶ Test with a swimming pool test kit. Increase or decrease the concentration as necessary.
- ▶ Allow 30 minutes to 1 hour before use.

Following treatment, the free residual chlorine level in the water at the point of use should not be less than 0.2 milligrams per litre and not more than 0.8 milligrams per litre. Aim for 0.5 milligrams per litre.

These chlorine producing chemicals should be applied in a tank (preferable clean and roofed) and not the dam. This will prevent unnecessary wastage as the dam would require a large quantity of chemicals. Also chlorine is quickly dissipated when exposed to sunlight.

Non-bacterial contamination

Chemicals such as dissolved salts and pesticides can exist in water at harmful concentrations. These can be tested for in a laboratory - refer to Water Facts sheet '*Sampling Your Water Supply*'.

Organic staining

Coloured water may cause staining of domestic utensils and clothes.

Control

Alum will remove any suspended matter and chlorination will make the water biologically clean, both of which will assist in reducing the discolouration of the water. But it may not be possible to clear the water completely.

Low oxygen levels in dam

In summer the surface layer in the dam will become hotter and therefore lighter than the cooler, denser water underneath. This tends to prevent oxygen reaching the deeper water. Suitable shade trees around the edge of the dam will help control this problem.

Warning

This Water Facts sheet is published as a general guide in the treatment of dam water. The chemical dosages recommended are averages only, and may not be suited to a particular water supply.

If the water is intended for human or animal consumption, have a sample tested, and seek advice on the interpretation of the results.

Assistance

Assistance with all aspects of your water supply, irrigation or drainage scheme is available from the Rural Water Advisory Services of the Department. Full details of the available services and associated charges can be obtained from your local Natural Resources office. ■