DEPARTMENT OF
PRIMARY INDUSTRIES

DAIRY EXTENSION CENTRE

Water Efficient Farming

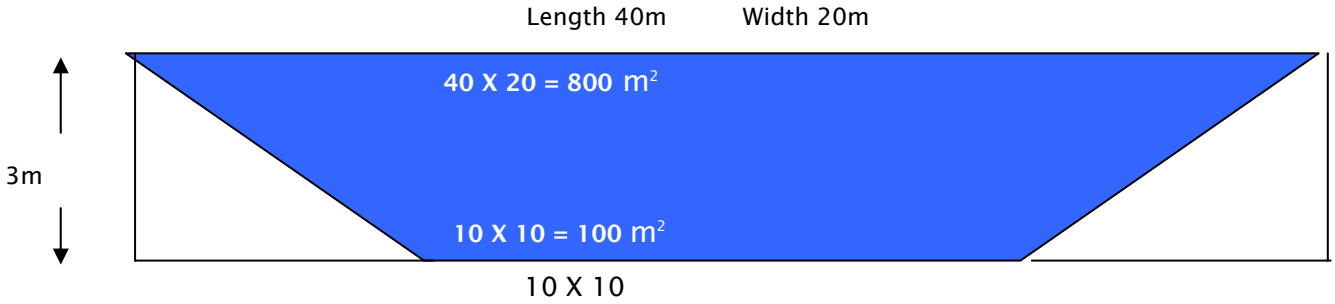
How to measure water in farm dams

Calculating your dam's capacity can be quite tricky, particularly when non-symmetrical shapes are involved. Here are 2 simple methods to use and some example dimensions.

Method 1 Determining volumes of irregular shaped dams with varying slope

Step 1 Determine the surface area = area 1
Step 2 Determine the area of the bottom of the dam = area 2
Step 3 Calculate the average area of the dam
(this allows for dam wall slope)
(area 1 + area 2) divided by 2
Step 4 Multiply the average area by depth = volume of dam

Example using dam dimensions in diagram below:
Step 1 Surface area of dam is 40m X 20m = 800m^2
Step 2 Bottom of dam is 10m X 10m = 100 m^2
Step 3 Average dam area is 800 + 100 = 900 / 2 = 450m^2
Step 4 Volume is 450 m^2 X 3m = 1,350m^3 = 1,350,000 litres = 1.35ML
(note: 1,000 litres = 1 m^3 = 1ML)



Method 2 Determining dam volume of regular shapes using slope
If you don't know the average area of the base of the dam, but you know the batter slope and depth of the dam then the above calculation can be modified.

Batter slope can be estimated by using a long stick into the side of the dam to see how much rise there is compared with the horizontal distance, eg. a batter slope of 3:1 (horizontal:vertical) means for 3 metres horizontally there is a 1 metre rise vertically.

Another indication is how the dam was dug. For example an excavator can dig dams with a slope up to 1:1 whereas a bulldozer would only be able to dig at a slope of 2:1.

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Method 2 continued

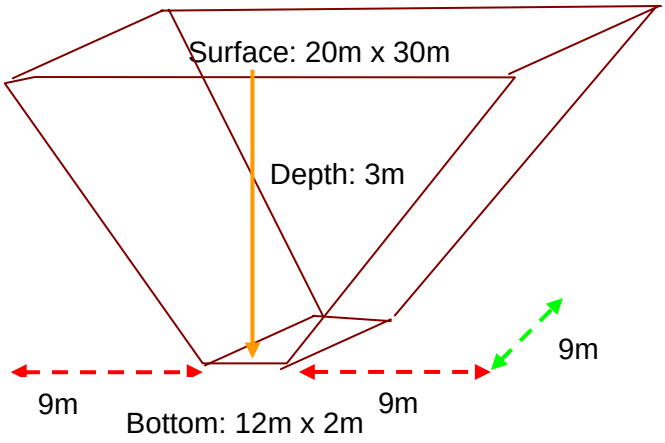
Example: Length: 20m, Width: 30m
Depth: 3m, Batter slope: 3:1

Step 1: Calculate the dam bottom area.
If the batter slope is 3:1 it means that over a depth of 3m the dam will go in 9m horizontally on every side (3m depth x 3m batter slope).
Base length: 20 – (2 x 9) = 2m
Base width: 30 – (2 x 9) = 12m
(multiplying by 2 includes both dam sides)
Bottom area is 12m x 2m = 24m²

Step 2: calculate the surface area
20m X 30m = 600m²

Step 3: Calculate the average area of dam
600m² + 24m² = 624m² ÷ 2 = 312m²

Step 4: Calculate dam volume
312m² x 3m = 936m³ = 0.936ML



Further examples of dam dimensions and volumes:

Surface m x m	Slope	Bottom m x m	Depth	Volume ML
20 x 30	2:1	4 x 14	4	1
30 x 40	1:1	22 x 32	4	3.7
70 x 90	2:1	54 x 74	4	20

How long will the dam water last?
Evaporation from dams can be significant and is influenced by wind, temperature of water and air, dam surface area and humidity. As a rough rule of thumb, reduce dam volumes by 10% to allow for this.
Using the 1st dam example this means the revised volume is
1,350m³ X 0.9 = 1,215m³ = 1,215,000 litres

Then divide the volume after evaporation by the water consumed daily by stock.
For example if the water is used just for the milkers,
200 milking cows @ 150 litres/cow
= 30,000 litres / day required

1,215,000 litres ÷ 30,000 litres/day
= 40.5 days of water available
(assuming no further run off into the dam)

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