

Ram pump

Supplying mains or borehole water for field grazed livestock at remote sites isn't always a practical option. Alternative watering systems are available, depending on the site and stock requirements.

This leaflet looks at the installation of a ram pump to supply drinking troughs for field grazed livestock. The work was carried out as part of a Scottish Government funded trial to investigate alternative watering options.

What is a Ram pump ?

A hydraulic ram pump utilises the energy in a larger flow of water at relatively low pressure (head) to pump a smaller flow of water at a higher pressure (head) to supply drinking troughs. **It requires no alternative source of power** other than the energy in the flowing water.

The ram systems installed under the trial consisted of three main components

- An abstraction point removing water from the watercourse
- An intermediate chamber to act as a supply tank
- Pump to distribute water to troughs



Points to consider when choosing a ram pump

- What is the water requirement of livestock (both overall and to satisfy peak drinking demands)?
- What is the distance and height (head) required to allow a drinking trough at a location **to remove risk** of poaching, erosion and faecal contamination of watercourse being protected?
- Do you have the required head and flow to support a Ram system?



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Protecting water quality

Under Diffuse Pollution General Binding Rules, significant **poaching within 5m of a watercourse is no longer acceptable.**

Where livestock frequently enter water for drinking or crossing and cause significant poaching, alternatives need to be considered. The following hierarchy is recommended when considering livestock watering options :

- Extension of mains supply
- Extension of existing spring or bore supply
- In-field bowsers
- Off-line gravity feed trough
- Alternative watering system, e.g. pasture pump, solar PV or ram pump.

Ram pump system components included:

- Abstraction point from watercourse
- Sealed pipe transfer to intermediate chamber/tank
- Supply pipe connecting chamber/tank to pump inflow
- Pump (installed in sump chamber)
- Discharge drainage connection from pump chamber to watercourse
- Piped delivery systems to one or more troughs
- Large capacity drinking troughs which also act as water storage

RAM System

Pros:

- Uses energy within the watercourse; no additional power source needed
- Potential to supply a number of drinking troughs
- Suitable for all livestock

Cons:

- Site specific; considered installation needed for correct operation
- Ram pump costs around £650 (ex VAT); additional fittings for installation and ground works could take this up to around £3000+, depending on the site
- Authorisation falls under a registration or licence (depending on daily abstraction rate). See the CAR Practical Guide.

Funding

For funding towards **alternative watering for field grazed livestock**, see options under Scottish Governments [Agri-environment Climate Scheme](#) for details.



What is required for a ram pump system?

At the West coast trial site, water entered the abstraction point and was piped to an 'intermediate chamber' via a below-ground sealed system which supplied the pump. Water was then pumped to supply a number of troughs on site.

The intermediate chamber provided a constant water level at the required supply head above the pump. The intermediate chamber was placed 40m uphill of the pump inlet level to collect and supply water to the top end of the pump supply pipe. The water level was maintained in the intermediate chamber at 4m above the pump inlet level, providing the operational head required at the site.

Water left the intermediate chamber via the supply pipe to drive the pump. By creating an increase in water pressure at the pump, some of the water was forced into the distribution pipe via a non-return valve. The distribution pipe supplied the trough(s). Water was pumped to the trough(s) on demand (controlled by a float valve). The pump operated constantly; exhaust water from the pump was discharged back into the watercourse.



A typical supply head of between 1m and 10m is required. At the West coast trial site, the pump operated on a 4m head. To achieve this, the distance between the abstraction point and the return was <200m measured along the watercourse.

Siting and suitability of a ram pump will depend on the individual site. For example, on sites where the watercourse falls at a steeper gradient, the distance between the abstraction point and the return can be reduced. Basic requirements and guidelines are provided in the pump manual (details below).

Design should include appropriate water storage capacity; water should be 'accumulated' to support a number of stock drinking at times of high demand. This could be by either providing water storage above the level of the troughs, to allow gravity filling to the troughs on demand, **or** by using large capacity troughs fitted with a float valve to allow control of filling and prevent overflow.

Further information:

- Alternative Watering for field grazed livestock 1 - Abstraction Systems. SRUC Technical Note TN665 www.farmingandwaterscotland.org/
- Alternative Watering for field grazed livestock 2 - Pumping Systems. SRUC Technical Note TN666 www.farmingandwaterscotland.org/
- CAR Practical Guide; includes requirements for authorisation under CAR www.sepa.org.uk/water/water_regulation/regimes.aspx
- Controlled Activities Regulations (CAR) - The Water Environment (Controlled Activities) (Scotland) Amendment Regulations 2013. www.sepa.org.uk/water/water_regulation/car_application_forms.aspx
- Grazing Animals Project (2007). Watering stock on sites – Information leaflet 13 www.grazinganimalsproject.org.uk/stock_management.html
- PAPA Pumps - www.papapump.com Provides detailed guidance on how the Papa Pump works and downloadable pump manual. Note other RAM pump suppliers are available.
- Sniffer (2002). Off-stream water provision for livestock. Report no. [SR\(02\)01F](#) www.fwr.org/snifpr.htm

Also in this series:

- Abstraction design for water powered (ram) pumping systems
- Abstraction design for electrical/mechanical pumping systems
- Solar powered systems
- Pasture pump systems

For further details see www.farmingandwaterscotland.org or speak to your local agricultural adviser.

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