

MANAGE INTERACTION BETWEEN LIVESTOCK AND RIVERS OR STREAMS

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Description

Establish or modify land infrastructures of grazing areas in order to avoid or limit a direct access of livestock to surface waters, and exclude animal concentrations from some selected critical areas situated near the watercourse. This may consist of (1) fencing off rivers and streams, (2) organizing livestock streams and river crossing through specific bridges or path, and (3) re-located gateways of pastures away from watercourses and if possible from down slope to up slope.

The main aim is to reduce loss of total P, sediments and possibly also total N (NH_4 , organic N) both during low and high flows.

Rationale, mechanism of action

Free access of livestock, particularly cattle, for drinking or crossing to ditches, streams and rivers has many kinds of impact on nutrient and sediment budgets of the rivers:

- (1) direct input of nutrients via feces and urine into the watercourse, and
- (2) erosion of river banks and re-suspension of sediment, thus generating a flux of total P and particulate-P.

Fencing, and organizing livestock crossing over rivers prevent animal from walking down the banks and limits these impacts.

Gateways are another critical area of grazing fields (see also [2]). Around gateways concentration of livestock generates soil compaction and poaching which represent a high risk of surface runoff and erosion when situated near a water course or stream. The impact during rainfall decreases when the gateway is not directly connected with the flow pathways (distance to the stream); thus, moving the gate is a simple way to reduce this source of pollution.

Applicability

These measures are applicable to grazed land and livestock farms. Traditionally dairy cows or other livestock spend a long part of the year away from the barn, on pastures. Free access of livestock to rivers and streams is common in many countries or regions, especially in extensive pasturing or rangeland areas. Crossing watercourses is common when livestock move between fields, for dairy each day. The damage due to livestock crossing river is less a problem with stony rivers (giving less effects on sediments), unless animal manure is deposited into the watercourse.

These options should be combined with other measures that create riparian zones or buffer strips along rivers (*see corresponding factsheets in 7.3 and 7.4*) or stream banks erosion control through bioengineering techniques.

- Fencing (e.g. electric fence) means creating a protecting area of a minimal width (1 to 3 m) along the main water courses. These areas might be managed (*see 7.3 and 7.4*). It may be impossible to apply this method in regions with a high density of small streams, ditches, and influenced stream banks, for example on upland farms with more or less extensive grazing (headwater catchments).
- Bridging the necessary crossing areas often goes with reducing the number and size of livestock crossing areas, and with fencing. In some circumstances (e.g. uplands already mentioned), strengthening the stream bed of remaining necessary crossings with e.g. gravel or geotextile could be a compromise.
- Moving gateways: it is commonly relevant and there are few cases that would limit the adoption of this measure. It is applicable in sloping areas. (see [2])

Constraints: fencing creates an ungrazed area which has to be managed and also a need for a new watering systems allowing cattle to drink without entering the stream; re-setting gateways and organizing better crossings for livestock implies reorganizing some aspects of the travel lines or animal travel pathways.

Effectiveness, including certainty

When applied together, fencing and bridging lead to an average loss reduction at the dairy farm level of $N < 1$ and $P < 0.05$ kg/ha/yr [1]. Significant levels have been obtained at the watershed scale when combined with stream bank erosion control [2,4].

Relocating gateways is evaluated by UK experts with a significant potential reduction for loss of total P [2].

Effectiveness must be considered including other benefits in term of water and ecosystem quality (reduction of fecal contamination, improvement of aquatic habitat).

Time frame

Effect of disappearing of livestock droppings directly into watercourses and resuspension of sediments can be expected on very short term (a few months), especially during low flow periods. Other impacts such as damage on banks will take longer to be stabilized by vegetation (year), and are strongly dependent of initial disturbance.

Environmental side-effects / pollution swapping

The measures have no effect on water quantities. They will also reduce input of suspended solids and fecal contaminants and improve stream biota. Biodiversity tends to increase (macro-invertebrates) and in some rivers fish reproduction conditions are improved (less inhibition by excess amount of sediment).

Possible negative side effects are: livestock has a tendency to walk along fences and to create paths which become bare, with a risk of concentrated runoff. Fencing increases fragmentation of the landscape for large fauna. Management of vegetation along fences has to be done environmental friendly.

Relevance, potential for targeting, administrative handling, control

The option can be relevant for all permanent components of the hydrographic network impacted during the grazing season but should be adapted to regional conditions like climate and hydrography. In some regions, treating wetlands in the same way, e.g. providing walkways through wet areas or fencing off these areas, can be relevant.

Visual check will be easy but requires field visits. Regular testing of rivers during low flow periods must show a decrease in values of *E. coli* during low flows, and a better habitat for fish.

Costs: investment, labor

No specific skills and technical equipment are needed to apply these measures, other than those already available on farms, nothing else but time and labor. Additional costs or investments are needed for bridges and fences and drinking devices for animals. It may be necessary to give subsidies for covering these costs and to organize a new grazing plan, for which extension services could be useful.

References

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