
How do I repair pugged pasture?

Posted on January 4, 2023 by Christine O'Reilly, OMAFRA Forage & Grazing Specialist



Key Points:

- Pugging is sod damage and soil compaction caused by livestock hooves.
- Prevent pugging by moving livestock to a barn, dry lot, or sacrifice paddock.
- Assess the severity of pugging to determine the most appropriate repair options.
- Timely repairs maintain pasture yield and keep weeds out.

Livestock may damage pastures when the soil is waterlogged. Wet soils are less able to carry weight than dry soils. Hoofprints that cut into the sod, make mud, and/or fill with water are called “pugmarks”, which is where the name “pugging” for this type of damage comes from.

Pugging can reduce pasture yields between 16% and 80% in the following 12 months, depending on the soil type, how wet it is, the stocking density, and how long livestock are in the paddock^[1]. Some of this yield loss is due to plant damage, such as burying or bruising leaves.

The rest of the yield loss is a result of soil compaction in the root zone. Smearing and compression from hooves in the mud destroy the soil structure and pore space. These are necessary for water to drain through the soil, rather than run off the surface. Compacted soil limits the ability of roots to grow down through the soil profile, which in turn reduces the plants’ access to water and nutrients at depth.

Pugged pastures also have bare soil that allows weeds to encroach. Timely repairs are important to keep weeds out of the pasture. In addition, the pugged surface can sprain ankles, and is rough to drive over.

Preventing pugging

Preventing pugging is often easier than repairing the damage. Take preventative action when wet weather is in the forecast.

- Move livestock to a barn or dry lot and feed stored forage until the ground dries.
- Move livestock to a sacrifice paddock and feed stored forage until the ground dries. Ideally this paddock is well-drained. The sacrifice paddock may be an under-performing paddock that is scheduled for renovation anyway.
- Use on/off grazing during wet conditions to maintain high-quality pasture while minimizing pugging.
- Reduce travel through high-traffic areas by using different gates to enter and exit the paddock.
- Move water troughs and salt/mineral feeders daily.
- Create temporary laneways with electric fence to concentrate damage to smaller areas.

How to assess a pugged pasture

Tools required:

- A quadrat (either 1 square foot or 0.25 m²) or hula hoop
- A tape measure or ruler

Select several areas across the pasture to gain a representative view of the pugging. Use the quadrat to help estimate the percentage of the pasture area that is pugged. Use the tape measure or ruler to measure the depth of the pugmarks. Table 1 combines these factors into a severity rating. The Australian guide [Pasture Recovery from Pugging Damage](#) has further detail and great photo examples.

Table 1. PUGGOLOGY Chart: Severity of pasture damage using an area x depth matrix	Area of Paddock Pugged				
Depth of Pugging	0-25%	25-50%	50-75%	75-<100%	100%
Shallow 0-2.5 cm (0-1 in.)	Very Light	Very Light	Very Light	Light	Light
Moderate 2.5-5 cm (1-2 in.)	Very Light	Light	Moderate	Severe	Very Severe
Deep 5-7.5 cm (2-3 in.)	Light	Moderate	Very Severe	Very Severe	Very Severe
Very Deep >7.5 cm (>3 in.)	Moderate	Severe	Very Severe	Very Severe	Very Severe

Source: Mickan 2011^[2]

Options to repair pugging damage

Very light or light damage:

- Provide longer rest periods for the pasture to recover between grazing events.
- Apply 55-85 kg/ha (50-75 lb/acre) of nitrogen to grass pastures in the early fall to encourage tillering.

Moderate damage:

- Roll and/or harrow to help level rough areas.
- Overseed to thicken the stand.
 - With a sod seeder or no-till drill use narrow row widths (<19 cm (<7 1/2 in.)) or cross-seed.
 - With a broadcaster, be sure to harrow or cultipack afterwards to improve seed-to-soil contact.
 - Consider frost seeding in early spring.
- Ensure the pasture has good soil pH and fertility, especially phosphorus (P) and potassium (K), based on a recent soil test. Use 22 kg/ha (20 lb/acre) of nitrogen (N) as a starter fertilizer.
- Use temporary fences to keep livestock off the pugged area while new seedlings establish.

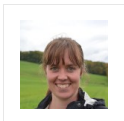
Severe or very severe damage:

- Till to level the damaged area. How aggressive tillage needs to be depends on soil type and moisture. Tillage may need to be deep enough to break up a compacted layer below the pugmarks.
- Cultivation may be required to create a fine, firm, crumbly seedbed.
- Seed a new stand with a drill or packer-seeder.
- Ensure the pasture has good soil pH and fertility, especially phosphorus (P) and potassium (K), based on a recent soil test. Use 22 kg/ha (20 lb/acre) of nitrogen (N) as a starter fertilizer.
- As part of the renovation process, consider rotating out of pasture to an annual forage crop for a year, then re-establish the perennial pasture.
- Use temporary fences to keep livestock off the pugged area while new seedlings establish.^[3]

References

1. Drewry, J.J., K.C. Cameron, and G.D. Buchan. 2008. *Pasture yield and soil physical property responses to soil compaction from treading and grazing – review*. Australian Journal of Soil Research. 46(3):237-256. Available: https://openresearch-repository.anu.edu.au/bitstream/1885/35728/2/01_Drewry_Pasture_yield_and_soil_2008.pdf
2. Mickan, F. 2011. *Pasture recovery from pugging damage*. Department of Primary Industries Farm Services, State Government of Victoria, Australia. Retrieved 30 November 2021 from <https://vgls.sdp.sirsidynix.net.au/client/search/asset/1017146>
3. Teutsch, C. Date Unknown. *Strategies for repairing pugged pastures*. Master Grazer program. University of Kentucky, College of Agriculture, Food and Environment. Retrieved 29 November 2021

from <https://grazer.ca.uky.edu/content/strategies-repairing-pugged-pastures>



About Christine O'Reilly, OMAFRA Forage & Grazing Specialist

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