

## CAUSTIC TREATED GRAIN

Treating grain with caustic soda creates a high energy feed which can be stored for use over the winter. Purchasing grain, particularly when prices are low during the summer months after harvest, and treating on-farm can provide a cost effective digestible and ruminally stable feed for livestock.



### Key Points:

- Homegrown caustic grain can be a relatively low-cost, high energy feed
- There is a significant difference in cost between home-produced and bought in
- Caustic treatment gives grain greater rumen stability
- Safety precautions must be observed if caustically treating grain on-farm

### About caustic treated grain

- To make caustic treated grain, caustic soda (sodium hydroxide, a strong alkali) and water is added to high dry matter grain.
- The dissolved alkali and water permeate the grain and swell the outer starch granules, causing the seed coat to rupture, increasing digestibility.
- With caustic wheat made at a cost of 7.4p per litre of milk produced compared to crimped wheat at 8.9ppl, caustic treated grain provides an economical option for homegrown cereals.

### Feeding caustic grain

**Acidosis:** caustic treated grain poses a much lower threat of acidosis compared to other starch sources, as:

- The starch is not as rapidly utilisable by the rumen microbes in comparison to ground or rolled cereals, so it is released and digested more slowly.

### Homegrown vs. buying in

When thinking of feeding caustic treated grain, there are 3 options:

1. **Homegrown** grain can be harvested at 75-85% DM, earlier than grain wheat (88%). Once clamped, it can be kept for over a year.
2. **Caustic treating bought-in grain** means that smaller batches can be treated as and when they are needed.
3. **Bought in ready-made** reduces labour and machinery requirement. Check what state the product will be on arrival. If it is freshly mixed it could need spreading to cool before clamping, increasing costs. Bought-in soda grain is a lower dry matter and must be used within 3 weeks.

- The alkalinity of caustic soda also reduces acidity in the rumen. This means that no extra buffer needs to be fed.

**Minerals:** Caustic-treated grain is high in sodium, so mineral supplements will need to be tailored around this. Caution needs to be exercised when feeding caustic grain to dry cows as the high sodium raises the diet DCAB value.

	Pre-treated grain dry matter (%)	Total cost / tonne of dry matter
Homegrown cereal + treatment	75-85%	£152*
Bought in grain + treatment cost	88%	£193
Bought in ready treated (cooled)	65%	£233

\*Source: Kingshay Forage Costings Report 2014

The table above compares the total costs of each option including fertilisers, rent and labour where applicable, and compares them on a tonne/DM basis. *The Kingshay Forage Costings Report includes total costs for a wide range of homegrown feeds.*

## Before you start the treatment process

- Caustic soda is a highly corrosive substance and extreme care should be taken when working with it. Protective gloves, goggles, overalls and wellies should be worn.
- Store the chemical in a locked container.
- Caustic soda and its chemical containers are classed as hazardous waste and must be disposed of as such. See the *Agricultural Waste Farming Note* for more details.
- Ensure a good supply of water as you may be adding as much as 600 litres to a single mix. The flow rate of a mains tap is typically 15-20 litres per minute. This means it could take half an hour to run this amount of water. A large header tank or bowser could speed the process up.

## Calculating the water application rate

**Table 1. Water application rate litres/tonne**

Moisture content of grain	'Early Feed'	'Storage'
22%+	50	20
20%	100	40
18%	130	60
16%	165	80
14%	210	100
12%	225	140

## Caustic treatment process

### Step 1 – Add grain to mixer wagon

- Leave enough space for the water to be added (see above).
- Avoid overfilling as this can break shearbolts.

### Step 2 – Add caustic soda

**Table 2. Caustic soda application rates**

Wheat	Barley	Triticale
30kg/tonne	50kg/tonne	40kg/tonne

- Break up any lumps of caustic soda as they will be poisonous to stock.
- Set the diet feeder mixing and slowly add the caustic.
- Leave running for 5 minutes as a dry mix.

### Step 3 – Add water

- Follow application rates in table 1 (above).
- Add straw if required at a rate of 20kg/tonne of grain. This helps prevent the grain sticking

- Ensure loader bucket, mixer wagon and the area for storing and spreading the grain are clean.
- Park the feeder so it is protected from the wind and that caustic does not blow back at you.



Caustic soda is a hazardous chemical, and contact can cause severe chemical burns. The following first aid actions should be performed, as well as calling a doctor if direct contact with the chemical occurs:

- **Contact with skin:** wash off immediately with water only, not soap.
- **Contact with eyes:** wash with plenty of water for 30 minutes whilst rolling eyes.
- **Ingestion:** immediately drink large quantities of milk (preferably) or water. Do not induce vomiting.

Caustic treated grain should be fed at a moisture content of around 30%, so if the grain is to be fed shortly, the 'Early Feed' water application rate will achieve this.

Where the grain is to be stored for a period of 3 months or more, a lower moisture content is needed ('Storage' application rate), but the grain will need to be wetted to 30% moisture before feeding.

together and aids cooling. The caustic soda also splits the cellulose from the lignin in the straw, improving its digestibility and feed value.

- Continue mixing for 15-20 minutes ensuring that the caustic dissolves and generates the heat essential for the process.

### Step 4 – Empty mixer wagon

- Discharge grain onto a clean concrete surface and leave for 5 hours for the grain breakdown process to continue.

### Step 5 – Spread grain to cool

- Level out to a depth of 30cm (1 foot) and leave until cool.

### Step 6 – Store grain

- Rats find soda grain unpalatable, but weevils can be a problem. Grain will need to be properly sheeted up, whether indoors or out.
- Wait at least 4 days before feeding.

Caustic-treated grain represents a stable, high energy feed – bought in or home produced.

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