

# Cereal Options

## Guide to DM Content for Whole Crop and Moist Grain Harvest

Whole Crop DM %	Description		Crop Colour	Grain Texture	Grain Moisture %
36-38	Fermented whole crop		Green ear Green stem	Soft dough	
39-42			Ear starting to yellow, stem green	Soft cheddar	
43-46			Ear mainly yellow, stem starting to yellow	Soft cheddar	
47-54			Ear and stem mainly yellow, some green on stem	Hard cheddar, grains easily split with thumbnail. Assume crop moisture loses 1- 2% per day	
55-65	Urea treated whole crop	Crimped grain (60-70% DM) Urea treated grain (65-72% DM)	Ear and stem yellow, hint of green on stem	Hard cheddar, moist grains can still be split with thumbnail	35
66-70	Whole crop processed (e.g. alkalage)	Combinable grain	Ear and stem yellow/golden brown, some green on nodes	Mature grains hard, difficult to split	≤ 30
71-80			Ear and stem completely yellow/golden brown	Grains very hard, some heads bending over	> 25
>80			Ear and stem completely yellow/golden brown	Full maturity, ready to combine	< 20

# WHOLE CROP CEREAL SILAGE

## Type of Crops to Use

1. Use high grain yielding crops, minimum 3 tonnes per acre and preferably 4 tonnes grain / acre. A high yielding winter wheat and a high yielding spring barley crop will give similar (excellent) performance, provided grain yield is at least 50% of the total DM yield
2. Poor grain yielding crops will result in poor quality whole crops with a feeding value similar to 60 DMD
3. Crop yield is consistent from the soft- cheddar stage to ripening i.e. 43% to 18%
4. Crops cut with a high stubble will have lower yields but higher feeding values. Crops cut with low stubble will have higher yields but lower feeding value. Grange have compared 12 cm and 29 cm stubble for winter wheat and spring barley with no difference in animal performance.
5. Whole-crop wheat or barley silages should ideally be produced from crops that are between 40 - 45% DM. The target is to have at least 50% grain in a crop that has a 12 cm stubble, giving a starch content in excess of 20% of the crop DM.

## Harvesting

1. Harvesting should not take place until after the cereal grain has progressed beyond the milking-ripe growth stage. Harvest crops at the soft cheddar consistency
2. Direct precision chop harvester is preferable. Mowing & picking up will lose grains
3. Only crops with a DM greater than 50% require grain processing i.e. a cracker on the harvester.

## Ensiling

1. Preservation does not need an additive. An additive may be needed if the crop is cut very dry i.e. grain DM less than 30% OR if the silage is to be fed out during warm weather i.e. late spring / early autumn.
2. Whole crops need to be well compacted and weighed down. A short chop length will help preservation.
3. Conservation losses should be limited to a target of 12% of harvested DM, producing aerobically stable silage with negligible mould presence.
4. A narrow pit is preferable.
5. Lay bait around the pit

## Grain to Straw Ratio

Work on the guideline that if you have a wheat crop ready to combine harvest in late August, the harvested DM yield will be about 50% grain and 50% straw (cut to ankle height) if it were modest yielding and, 60% grain and 40% straw for an exceptional crop. A good crop of winter wheat at 4 t, a ratio of 55:45 might be expected. On that basis, a winter wheat of ~4 tonnes grain/acre is good and thus that as a whole crop it would have yielded about 3.2t grain DM + 2.6t straw DM = 5.8t harvested DM per acre or 5.1 t utilisable DM (losses assumed to be 12.5%).

## Valuing the Crop

### Method 1.

Estimate Grain Yield by Experience or Other Crops Harvested on the Farm or Harvest a strip of grain off the field, weigh it and measure the area harvested. Based on the harvested yield, extrapolate out the total yield of grain per acre and the whole crop yields based on the ratios above and calculations in (2) below.

Grain Yield (4 tonnes @ €170/t)	€680
Straw value per acre on the ground	€150
Minus harvesting cost	-€55*
Total Value to the tillage farmer	€775 / acre

Total costs to the livestock farmer = €680+150+115	€945
Expected Utilisable Yield of a 4 tonne grain crop	5.1 t DM / acre
Cost per tonne DM	€185

Method 2. Harvest the whole crop, weigh every / proportion of trailer loads to get total yield and ensile it. Having allowed a fermentation period of 3-4 weeks, get the silage analysed for dry matter and starch content. Based on the starch content of the silage, put a value on the silage, relative to rolled barley and soya, according to the table below.

**Method 3. Approximate Values Cereal Crops, Grain + Straw (25%+ starch), including harvesting cost Relative to Rolled Barley & Soya\***

	Value €/ t Utilisable DM
Rolled Barley Price	
€225	180
€265	212

\*Soya is assumed to be €450 / tonne;

## GRAIN TREATMENT OPTIONS

Preservation Option	Optimum Moisture Content %	Requirement for Ventilation	Storage Unit
Dried	14	Yes	Feed store or bin
Green	15-16	Yes	Feed store or bin
Organic Acid Treated	18-22	Yes	Feed store
Crimped	30-40	No	Ensiled anaerobically
Ammonia treated	30-40	No	Ensiled and sealed
Alkali Treated	18-22	No	Feed store

### Grain Drying

From 40% MC to 20% MC grain will dry by 0.9 to 2.9 percentage units per day, depending on the crop and weather conditions

### Costs

There are relatively small differences between the cost of the different grain treatment options, apart from drying. Approximate cost is €30 / t, including processing, additive, storage losses and working capital cost.

### Acid Treatment

- Popular to roll grain at the time of organic acid treatment using a crimping machine and store the grain aerobically in a clean, dry vermin proof store. This eliminates the workload attached to rolling at the time of feed-out and ensures the acid is uniformly applied.
- To control insects, the grain temperature must still be reduced after treatment, so some ventilation is still necessary.
- For long term storage of grain, rolled and treated off the combine, increase the application rate by 10%. This should also be ventilated, according to the rates described previously
- For pulses increase the application rate by 10%.
- When moisture content is less than 25%, it will be necessary to crack pulse seeds prior to treatment.
- Proppcorn Application Rates:

Cereal Grain Moisture %	Litres propionic acid / tonne
16	5.5
18	6.5
20	7.5
22	8.5
24	9.5
26	11.5

### Crimp

- Harvesting grain 30-45% moisture, crushing of grain and storing it anaerobically until feeding time. Under these conditions, it undergoes lactic acid fermentation.

- Suitable crops include barley, wheat, triticale, oats, maize, peas and beans.
- Crucial to the success of this system is achieving and maintaining strictly air-free conditions throughout storage, and minimising the duration of access to air during feed-out.
- The use of mould-inhibiting additives (bacterial inoculant, acid or ammonia based), prior to ensiling, helps to limit spoilage of the grain during feed-out
- Additives
  - Grange have compared the additives – 2xacid (Kemira & FSL Bells), 1 Biograin (Biotol, Lactobacillus buchnerii) and 1 Agriking
  - All preserved well
  - 1 acid improved aerobic stability (Kemira)
  - Biotol improved aerobic stability
  - Agriking did nothing

### Urea Treatment

- Urea is the most common source of ammonia used to treat grain harvested at 16-25%,
- The whole grain is stored under sealed, air-free conditions (e.g. sealed beneath conventional silage plastic sheeting) to prevent ammonia loss.
- Products – HomeN'Dry OR MAXIMOM. The advantage of these additives over the traditional urea is that the enzyme ureases is present to ensure that the grain seed coat is broken down so that it does not come through in the dungs.
  - Home N'Dry is a product that combined contains urea and ureases enzymes
  - Maximom – buy the urea and enzyme separately and mix on-farm. Need to be careful to use feed grade urea only.
  - Cost of both is approximately €25-30 / t.
- Sealed down for 4 weeks and can be left open in a shed after that. Unseal after 4 weeks, otherwise wastage on top
- Increases the crude protein content to 14-16%, depending on the starting CP%. Get it tested before and after the treatment to check the increase.

### Kildalton Experience 2012/2013

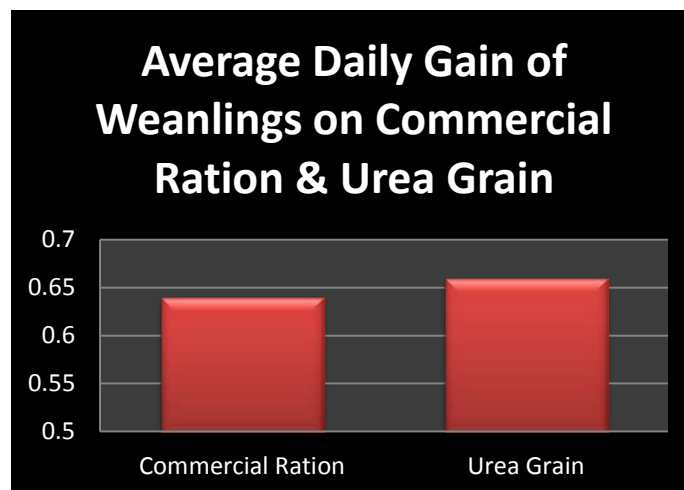
Weanlings in Kildalton were offered one of two rations.

Ration 1. HomeN'Dry Grain (CP=12.7%, MC=23%) + Minerals

Ration 2. Commercial Ration (barley, pulp, hulls, rapeseed meal, molasses & minerals, 0.93 UFL, 11% CP)

Feeding rate of 3 kg / head / day on 66 DMD grass silage

There was no difference in performance of weanlings on either the commercial ration or the urea grain



### Caustic Treatment

- The treatment of grain with sodium hydroxide (caustic soda)
- disrupts the seed coat of grains so that the grain can be fed directly to cattle without further processing.
- Whole grain can be harvested at up to 30% moisture is soaked in or sprayed with sodium hydroxide solution.
- This grain is then stored aerobically.
- The grain is harvested at the conventional stage or slightly earlier (15-30% moisture).

### Calculating the Value of Grain at Different Grain Moisture Contents (MC), Compared to Grain at Normal Harvest Time @ 20% MC

Cost of Grain @ 20% MC	30	35	40
150	131	122	113
160	140	130	120
170	149	138	128
180	158	146	135
190	166	154	143
200	175	163	150
210	184	171	158
220	193	179	165

### Checklist for Grain Storage

- Cleaning of stores
- Ventilation, where necessary - moving motors to ensure even ventilation, air movement, checks on temperature
- If acid treating and rolling – increase acid rate by 10-15%
- Vermin control
- Limit wastage in high moisture grain options – keep pit face clean, get across pit face at least 1-2 times per week
- Meeting DAF regulations for home mixing