



# KnowHow

Home-grown feed processing and preservation

AUTUMN 2017

FOCUS ON  
Savings from Silage

Be it grass, beans or maize, there are big savings to be made with home-grown processing and preservation. We show you how!



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Bean counting. Profiting from pulses - see page 4



High five! Top essentials for successful silage - see page 7



Cereal savers. Crimped maize does Yorkshire farmer proud - see page 8

## Research shows the true value of effective silage preservation

**An extra profit of almost £42/cow/305 days can be made through proven, effective forage preservation. Exciting new data shows that getting more milk (or meat) from conserved forage is a realistic proposition for any farmer, by minimising fermentation losses and, at the same time eliminating the considerable energy losses caused by aerobic deterioration of silage at feedout.**

Dry matter (DM) and energy losses from silage are a major cost to the livestock industry, so we make no apologies for the 'heavy' reading in the following paragraphs. If you have a genuine interest in getting more from the silage you make and have not yet joined the many UK farmers who are already benefitting from using Safesil, please read on.

The, as yet unpublished, research data has demonstrated the true value of Safesil, which contains high levels of the feed preservatives *potassium sorbate* and *sodium benzoate*. The research, carried out on high quality grass silage at SLU, Uppsala, Sweden, and by Dr D Davies on maize silage in the UK, demonstrates the economic value of minimising energy and DM losses during fermentation and the feedout period.

In the Swedish trial high quality grass silage was ensiled at 42% DM and was either untreated or treated with Safesil. DM losses during fermentation of 5% in the untreated silage and 4.25% in the treated

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silage were measured after 56 days ensiling. After three days exposure to air 0.3 MJ ME/kg DM was lost in the untreated silage, while the treated silage remained stable, with no measureable energy loss.

A similar procedure was conducted by Dr Davies with 31% DM maize silage. In this case fermentation DM losses were 3.15% for untreated silage and 3.01% in treated. After 3 days' exposure to air 0.68 MJ ME/kg DM was lost in the untreated silage and 0.27 MJ ME/kg DM in the treated, a difference of 0.41 MJ ME/kg DM.

From these measurements it is possible to put a true value, in terms of potential extra milk production and income, on what is often perceived by farmers as 'an expensive and unnecessary' silage treatment.



I will take as an example a 100 cow dairy herd fed 6kg DM of the high quality grass silage and 6kg DM of the maize silage over a 305 day lactation, with a farm-gate milk price of 28p/litre and with silage costs of £141/t DM for the grass silage and £123/t DM for the maize (AHDB costs).

With Safesil costing £1.50/litre and application rates of 3 litres/t FW (fresh weight) on grass and 1.5 litres/t FW on maize, the treatment cost of the 42% DM grass silage is £10.71/t DM and £7.26/t DM for the 31% DM maize.

Using these figures the value of DM lost in the grass silage can be calculated as follows:-

Untreated: 5% DM loss = 50 kg/t = £7.05

Safesil treated: 4.25% DM loss = 42.5 kg/t = £5.99

The treatment saves £1.06p/t DM during the fermentation period.

Aerobic spoilage loss of 0.3 MJ ME/kg DM in the untreated silage - (6kg DM fed x 0.3 MJ ME) = 1.8MJ ME less/cow/day compared to the treated silage.

Using the standard of 5 MJ ME to produce 1 litre of milk, 0.36 litres less milk/cow/day will be produced when untreated silage is fed. At 28p/litre this equates to 10.08p/cow/day lost. The silage treated with Safesil showed no energy loss during the feedout period.

6kg silage DM costs 6.43p/cow/day to treat ( $1071 \div 1000 \times 6\text{kg}$ ), with lower losses due to treatment equalling 0.64p/cow/day ( $106 \div 1000 \times 6\text{kg}$ ), and produces 10.08p worth more milk/cow/day.

So, taking everything into account (cost of Safesil - £1,962.00 to treat 183t DM @ 42% DM - more silage and more milk), the treated silage will produce 4.29p/cow/day extra income ( $(10.08 + 0.64) - 6.43 = 4.29\text{p}$ ).

For a 100 cow herd over a 305 day lactation this equates to additional income of £1,308.45 - a 66.7% return on investment.

Similar calculations for the maize silage show an even better return:-

Untreated 3.15% DM loss = 31.5kg/t = £3.87

Safesil-treated 3.01% DM loss = 30.1kg/t = £3.70

So, in this case, Safesil treatment saves £0.17p/t DM during the fermentation period.

Three days' aerobic spoilage resulted in 0.68 MJ ME/kg DM being lost in the untreated silage and 0.27 MJ ME/kg DM lost in the Safesil-treated, a difference of 0.41 MJ ME/kg DM.

6kg DM fed x 0.41 MJ ME = 2.46 MJ ME less/cow/day when the untreated silage is fed. So, using the standard of 5 MJ ME to produce 1 litre of milk, the untreated silage will produce 0.49 litres of milk/cow/day less than the treated. At 28p/litre this represents 13.72p/cow/day lost when the untreated silage is fed.

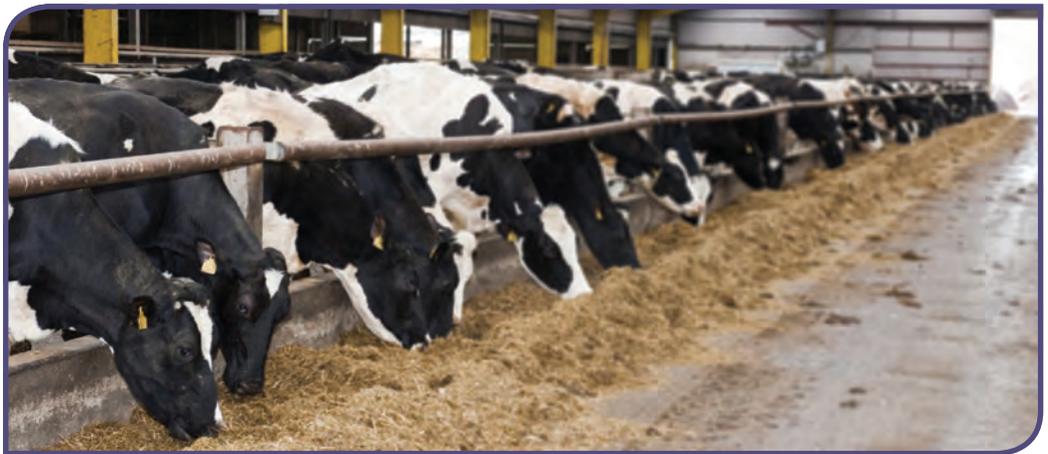
6kg maize silage DM cost 4.36p/cow/day to treat ( $726 \div 1000 \times 6\text{kg}$ ) with lower losses due to treatment equalling 0.10p/cow/day ( $17 \div 1000 \times 6\text{kg}$ )

So taking everything into account (cost of Safesil - £1,327.50 to treat 183t DM @ 31% DM - more silage DM and more milk) the treated maize silage will produce 9.46p/cow/day extra income ( $(13.72 + 0.10) - 4.36 = 9.46\text{p}$ ).

For a 100 cow herd over a 305 day lactation this equates to additional income of £2,885.30 - an amazing 217% return on investment!

While these calculations are purely theoretical they are based on sound scientific evidence which, as numerous trials and an ever-increasing number of livestock farmers in the UK have shown, can help to reduce concentrate bills and increase production of both milk and meat from home-grown forage.

With maize silage harvest fast approaching, and the potential for some very high quality crops to ensile, don't let fermentation and aerobic losses eat into your profits. Good clamp management, from filling (compact the crop with a SilaFactor and seal the clamp with O<sub>2</sub> Barrier 2in1) to feedout, coupled with the proven energy-saving ability of Safesil could ensure you get significantly higher returns from your forage this year.



# An overview of the place for beans - starting and finishing with your policy



By Roger Vickers CEO of PGRO (Processors and Growers Research Organisation)

**Policy - a word that turns most people off - is probably an unpromising one to start an article.**

**It was, however, CAP reform that started some mixed farmers thinking about how best to make the most of the greening regulations to maximise their home-produced protein and reduce their outgoings. Since then the national crop area of beans, practices of home feeding, and utilisation within the feed industry in general have increased.**

As a result, with a focus on produce grown and fed on farm both as preserved grains and as wholecrop silage a previous edition of *KnowHow* featured the feeding qualities of beans. Pages 4-9 Spring edition 2016 ('Hold on to more profit with home-grown beans').

The current CAP regulations, announced in 2014, encompass the probably now well-understood 'Three-crop rule' and its requirements for Ecological Focus Areas (EFAs). These requirements accelerated what was an already increasing interest in UK pulse cropping - especially in field beans. Bean

area rose steadily year on year following the CAP ruling, and as of harvest 2016 stood at approximately 175,000 hectares in England and Wales (source: DEFRA).

Policymakers love to make changes and, just as we were all getting used to the new situation, it was confirmed at the beginning of August 2017 that changes to the EFA greening requirements would come into force from the 1st January 2018. The changes will apply to crops from the point of sowing through to harvest. Thus encompassing crops sown in autumn 2017 and prohibiting the use of any plant protection products on EFA fallow, EFA catch & cover crops and for EFA Nitrogen Fixing Crops. (Ref. 1, see page 7)

It is too early to say what effect this will have on the area of beans sown for 2018 harvest - but what is certain is that the underlying reasons for growing them and the very real farming benefits they deliver to the rotation have not changed.

Beans are widely recognised as a low input crop. That said, to get the best out of them



they cannot simply be ignored. Planning and attention to detail, from the initial field selection right through to harvest, will help to ensure that the very best crop is realised. Inputs may be few but attention is required to ensure that the crop is well established, with free draining soil and an unimpeded root zone. Weed competition should be minimised, sufficient nutrition should be available and, as far as possible, the crop should be maintained free from the stress of pests and disease.

As nitrogen-fixing crops, beans do not require the application of any nitrogen fertiliser and can be expected to fix about 240kg of N during the growing season, leaving behind

a residue of 50-70kg for the following crop. (Value £36-£50/ha based on ammonium nitrate at £245/t) (Ref. 2, *see page 7*)

This nitrogen residue and the positive impact the beans have on soil structure and soil biology are a large part of the reason that cereal crops following beans are so much improved. These benefits are readily visible in a following wheat crop, but have a decreasing but still present impact for subsequent crops too. A typical first wheat after beans is likely to yield 0.8 to 1.0t/ha more. At current values this represents additional income of approximately £145/ha.

Being legumes, beans offer a very real break in largely cereal crop based rotations, giving the opportunity to control weeds both physically and with a different chemical armoury, therefore assisting in addressing the issue of developing pernicious weed populations. Weeds such as blackgrass have, in some areas, become extremely expensive or even impossible to control with conventional agrochemical tools and can have enormous negative impact on yields. In places, this has made cereal cropping almost unviable, hence beans in a wider rotation offer an opportunity to fight back and establish more robust cropping practices.

Soil borne diseases such as verticillium wilt, (Ref. 3\*) clubroot (Ref. 4\*) and take-all (Ref. 5\*) are becoming real barriers to sustainable productivity.

For growers used to producing oilseed rape and wheat, or any other crops in a close cropping sequence, the benefits of beans in extending their rotation are significant.

Of course, this does not mean that beans are without their own problems, and close sequence cropping of pulses should also be avoided. It is recommended that beans should not be grown in a closer than 1:5 rotation and seed should always be checked for freedom from stem nematode and ascochyta.

(\*See page 7)

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The nature of bean physiology has an impact upon annual workload on farm. A spring-sown crop opens the autumn workload window and the general maturity of the crop means it rarely competes with the winter wheat harvest. Earlier maturing varieties can be selected in northern growing areas and desiccation techniques can be adopted where even a few days can be a huge advantage.

The market for beans is diverse but the primary outlets are for human consumption and for animal feed. By far the largest human consumption market is in the export trade and depends upon having a bright and pale colour sample with good visual appearance. Crops making the grade will normally receive a premium which can be £15-25/t. The visual appearance is largely irrelevant for the animal feed market, however, a major barrier for the feed merchants is continuity of supply. In recent times this has been less of an issue and the feed merchants have enthusiastically taken the additional quantity of home-produced protein for processing. There is every indication that given reliable availability they will continue to do so.

Nor does any of this affect the fact that home-produced beans remain an excellent feed and an opportunity to retain more profit within the farm enterprise.

So often in articles such as this you will find gross margin figures quoted in an attempt to persuade you that the crop being discussed



is the most profitable, or at least comparable, to others you might consider. If we did that here for beans you would find that they more than hold their own - even without trying to monetarise the many agronomic and practical benefits outlined above, most of which are misleadingly accrued in and attributed to the following crops.

In reality, crop gross margin presentations are rarely accurate, for unless they take account of an individual's costs and performance, they can never truly represent a specific farm enterprise. The work of the PGRO is aimed at trying to improve the ability of growers to increase their output and profitability from pulse crops.

The leading growers do not have significantly greater input costs than anyone else and yet reach yields of 8 t/ha or more - measured against the average of nearer 4 t/ha. Hence, there are clearly a lot of possibilities to make a nonsense of many of the theoretical gross margins presented.

Whilst most farmers are almost certain to see the new EFA requirements as irritating, the reality is the same for all crops previously

The PGRO (Processors and Growers Research Organisation) is a long-established and well-respected applied research organisation that exists to provide pulse growers with information and advice as to how best to maximise their returns from bean and pea crops. It is funded by a voluntary levy collected on traded pulses and makes significant efforts to reach out to growers via its website ([www.pgro.org](http://www.pgro.org)), technical publications and face-to-face meetings.

grown on EFA areas – the changes are not a peculiarity of beans. Growers are going to simply have to look elsewhere, to hedgerows, copses, field margins, catch and cover crops and fallow to meet their 5% obligations. The key message to take away from all the above is that - with a little attention to detail - there is some serious profit to be had on farm

from pulses, and that fact has not changed.

Those who have been growing beans will, hopefully, have realised that it is a crop that offers so much more than the opportunity to tick a box for the regulator and, after full consideration, will keep beans in their well-deserved place in the farm's rotation policy.

## References:

Ref. 1. <http://www.agribrief.co.uk/generalpolicy/2018-greening-rules-confirmed/>

Ref. 2. <https://dairy.ahdb.org.uk/market-information/farm-expenses/fertiliser-prices/uk-fertiliser-prices/#.WY2b1lWGPIU>

Ref. 3. [https://cereals.ahdb.org.uk/media/136986/is22\\_importance\\_of\\_verticillium\\_wilt\\_in\\_oilseed\\_rape.pdf](https://cereals.ahdb.org.uk/media/136986/is22_importance_of_verticillium_wilt_in_oilseed_rape.pdf)

Ref. 4. <https://cereals.ahdb.org.uk/media/178197/is44-managing-clubroot-in-oilseed-rape.pdf>

Ref. 5. <https://cereals.ahdb.org.uk/cereal-disease-encyclopedia/diseases/take-all.aspx>

For more information on how best to harvest and preserve home grown beans please visit our website [kelvincave.com/science-centre/newsletters](http://kelvincave.com/science-centre/newsletters) and click on the spring 2016 issue of *KnowHow* to find out more from other farmers on how they are benefitting from growing beans and the techniques used to maximise their return on investment.

## High 5

## Silage-Making Essentials

For more information about these products please visit our website



**Safesil** is a special blend of food-grade preservatives that eradicates all the major spoilage organisms. Proven to be supremely effective across a wide range of dry matters and crops.



At 3m wide and weighing about 4,000kg with 11 individual roller rings, a **SilaFactor** speeds up the compaction process almost four-fold, saving both time and fuel and can increase dry matter compaction density by up to 40% when compared to conventional tractor rolling.



**O2 Barrier 2in1** is applied as a single sheet which transforms into two on the clamp; a protective, high-quality top layer covering a layer of very oxygen impermeable, polyamide vacuum film. O2 Barrier provides quick and effective clamp sealing with reduced workload, and up to a tenfold decrease in oxygen permeability.



**ClampNet** is a 300g/m<sup>2</sup>, heavy-duty green silage cover with seamed, stitched edges to prevent fraying or unravelling. It offers added protection from attack by birds and vermin and also helps to maintain compaction.



Made from 90 per cent re-cycled material with a life expectancy of around 15 years **ClampTiles** are ergonomically designed for ease of handling. Unlike tyres, they don't harbour rainwater and debris, and when not in use can be stacked on pallets.

# FAMILY FORTUNES



**Using crimped maize and cereals to rear and finish dairy-bred beef has transformed the fortunes of a Yorkshire farm.**

**Rearing pure dairy bull beef was introduced at Cross Hill Farm near Goole, as a side-line to the arable business, but today has grown to become the farm's financially most important enterprise and enabled the next generation of the family to work at home.**

The success of the dairy-beef business has hinged upon the use of home-grown feeds, with crops chosen carefully to fit the arable rotation and to provide high energy feeds for breeds which can be challenging to finish.

However, with the right feeds, the mainly Holstein bulls are sent to slaughter at 12 to 13 months, achieving deadweights averaging 230kg and returning a net margin of around £60/head - with home-produced feeds costed into the ration at their market values.

“With over 600 head going through every year, this makes the beef just as important as the arable business,” says Neil Welburn (*pictured opposite*), who farms with his wife Deirdre on the largely tenanted Yorkshire farm.

The cattle were introduced to the farm in 2008, at around the time the couple's son and daughter, Chris and Claire, returned respectively from Askham Bryan and Bishop Burton Colleges 'full of ideas'.

Because of the low price of dairy bull calves, the family were able to purchase high numbers, beginning with around 100 head in their first year, but soon scaling up the operation.

“Initially, we bought two- to four-week-old calves from local dairy farmers, and sold them as stores at six to eight months at a local market,” says Mr Welburn.

They would remain on milk and creep feed until eight to 10 weeks, and then go on to the largely purchased ration.

“This included a bit of everything such as chopped lucerne, flaked maize, dried, rolled cereals and sugar beet pulp, but when we worked it out, it was costing us a fortune,” he says. “I'd say it was at least £40-£50/tonne

more just because we were buying so much of it in bags.”

It was after about a year on this regime that two landmark meetings occurred, both of which would transform the system on the farm.

“We met Adam Buitelaar, (managing director of the Buitelaar Group which manages supply chains and processes rosé veal and young beef from the dairy herd) and we met Michael Carpenter (from feed and forage preservation specialists, Kelvin Cave Ltd),” he says.

The two meetings set off a series of changes which would lead to a shake-up of the arable rotations, significant revisions of the rations, and cattle being finished on the farm and sent directly to Buitelaar (the Woodhead meat plant in Lincolnshire) for slaughter.

“We had been growing wheat and getting around four tonnes/acre but when we met Michael at LAMMA in 2009, he told us that if we harvested three weeks earlier, we’d get closer to six tonnes,” recalls Mr Welburn. “He was absolutely right with this prediction, as that’s exactly what we did the following harvest.”

Although he accepts that some of the extra weight was accounted for by moisture, he says the dry matter yield per acre is also higher and the nutritional value of the crop at the time of the earlier harvest is at its peak.

The earlier-harvested wheat meant the grain had to be crimped – a process which involved passing it through rollers on the day of harvest to expose its carbohydrate and protein.

“A preservative is applied to the rolled grain

which is then stored in an airtight clamp or plastic tube,” says Kelvin Cave’s Michael Carpenter. “The process involves a controlled fermentation and will retain the maximum possible nutrient value and give better performance than dried grain.”

Mr Welburn committed around 200 tonnes of wheat to crimping in the first year, admitting he was nervous about keeping a high value of feed ‘outside in plastic bags’.



“It came home to me when a neighbour pulled up and pointed out we had £30,000-worth of feed in those bags,” he says.

However, he says he liked the way the moist product fed and how the cattle performed, and that storing the crimp outside freed up shed space for cattle.

“The cattle did really well on it,” he says. “The minute we started feeding crimp, they stopped coughing – as we do have a problem with pneumonia which is under investigation.”

The area of cereals for crimping across the 900-plus acres the family farms increased every year, and in 2011 the decision was taken to apply the same technique to grain maize.

“It’s not something that’s normally grown around here but we’ve found it fits perfectly into the crop rotation,” says Mr Welburn.

They chose to sow the maize after carrots, which are grown by a neighbour on short-term rented land and harvested in April or May. Because the maize is harvested as grain, many of the problems associated with a late harvest are overcome by the return of the crop’s stover to the land, which creates a

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*Everything except the grain is left in the field including the entire stover and centre of the cob. This makes harvesting much cleaner and protects the soil from run-off and erosion over the winter.*

mat under the combine on which it can travel without damaging the soil.

"I made up my mind I was definitely going to crimp the maize – I didn't even consider maize silage or anything else," he says.

"Our contractor had told us we could bank on yields of three tonnes/acre but may get up to six, and he was also exactly right," he says. "We tried just 40 acres of maize in the first year, using the lightest, blow-away sandy land

### Why crimp grain?

- ✓ Maximises nutrient value, digestibility and dry matter/ha
- ✓ Enables earlier harvest at peak nutritional value
- ✓ The process is simple – crimp, ensile, feed
- ✓ No drying or specialist storage is required
- ✓ Allows early establishment of follow-on crops
- ✓ Reduces grain loss in the field
- ✓ Harvest is less weather-dependent
- ✓ Turns home-grown moist cereals into quality, digestible and palatable concentrate feed
- ✓ Improves animal performance when compared to feeding dry-rolled cereals
- ✓ Backed by over 40 years' successful use in Finland and northern Europe

– the sort that would only yield two tonnes of wheat – and harvested 3.5 tonnes/acre."

Rations were reformulated by independent nutritionist, Lizz Clarke, and included 3.5kg crimped maize, 1.6kg crimped wheat, 0.5kg crimped beans, 1.5kg baled silage, 1.5kg dry barley, 2kg of a high protein molasses feed and 1kg Trafford Gold.

She says: "Crimped grain is a superb energy source for cattle because it is slowly fermented so bypasses the rumen, which is perfect in this system when you are aiming to finish from 10 months onwards.

"It is better utilised than dried grain and particularly suits these Holstein cattle which are difficult to put weight on.

"It is equally suited to dairy cow rations, and is much safer to feed than dried grain and less likely to cause acidosis," she says.

However, she says she has complemented the crimp in this ration with highly degradable ingredients to feed the rumen, which, on this farm, have variously included potatoes and molasses, depending on availability.

"In this system, energy is key while protein can be lower, and this ration analysed at a metabolisable energy of 13MJ/kg DM and 12% protein," she says.

Today, the area of maize grown for crimping by the Welburn family has increased to 240 acres and will hopefully expand in the future, with most used on the farm and some sold to neighbouring dairy herds. A temporary clamp has been built from wrapped silage bales and has been filled with around 550 tonnes of crimped maize.

"This has saved a substantial cost as plastic tubes are £300 a time and we'd need at least five for this amount of maize, costing around £1500," says Mr Welburn.

“All we now have to buy on a yearly basis is O2 Barrier 2-in-1 for the top sheet at around £300, but we’ll cut this in half and use it for the sides of the clamp the following year,” he says. “Everything else including the netting is a one-off expense so it’s a cheaper and tidier way to store the crimp.”



The monitor in the combine shows a yield of more than 10t/ha and moisture content of 36.2%.

Meanwhile, he says that crimped maize fits in perfectly with the spring-harvested, strawed carrots which are otherwise difficult to follow, is now yielding closer to 4t/acre and appeals to local landlords as it leaves the ground in a better condition than many of the alternatives.



Main picture: The crimped maize clamp - constructed from bales.

Inset: Ingredients in this TMR include crimped maize, crimped wheat and dry silage.

“Rents are high and we have to compete with land for anaerobic digestion, but the landlords like the fact that we return organic matter and structure to the soil and don’t leave the field in a mess,” he says.

“We put farmyard manure on to the land before seeding, and the only thing we take off is the grain. The combine pulls the stalks through the header and chops and lays them in a mat so there’s no mess at harvest and no exposed soil or run-off over winter.

“We feel we have found a system which dovetails perfectly with the rest of the farm, makes good use of difficult land and has doubled the turnover of the business – but most of all, it’s allowed all of the family to stay at home and work on the farm,” he says.

### Crimping cereals and maize for cattle feed

Crimping cereals or maize involves rolling the early-harvested grain through a crimping machine, to expose the carbohydrate and protein, and the application of a preservative. This ensures a controlled fermentation and maximum nutrient retention once stored in an airtight clamp (or plastic tube). A range of modern preservatives allows cereals to be crimped at moisture contents of 25%-45% and maize at 35%-40%. Crimp must remain sealed for at least three weeks and can then be fed throughout the year.

## Meet the Sales Team



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## Dates for your Diary

Come and see us at any of the following events throughout the remainder of 2017 and into early 2018:

**4 October**

*Dairy Show*

Bath & West Showground, Shepton Mallet

**27 - 28 November**

*Royal Welsh Winter Fair*

Llanelwedd, Builth Wells, Powys

**17 - 18 January**

*LAMMA*

East of England Showground, Peterborough

**7 February**

*YAMS*

York Auction Centre, Murton, York



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