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Milk Manager NEWS

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The European Agricultural Fund for Rural Development
Europe investing in rural areas

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Milk Manager NEWS

Market Update

UK Wholesale Dairy Commodity Market

- Fonterra's latest on-line GDT auction (6th November) resulted in a 2% decrease in the weighted average price across all products, reaching US $2,851/t. The last upward movement in price was in May 2018. Butter continues to decline (-1.7% to $4,045/t) and cheddar cheese showed the biggest fall of 4.6% to $3,250/t. Only skim milk powder and butter milk powder increased slightly (by 1.2% and 0.8% respectively).

- In the UK all dairy commodities fell in price for October, with the biggest reductions in butter and cream. Weak demand, coupled with milk production remaining steady and slightly ahead of last year are the main drivers on price. Buyers are hesitant with the uncertainty about Brexit and are not wanting to purchase products too far forward.

Commodity	Oct 2018 £/T	Sep 2018 £/T	% Difference Monthly	Oct 2017 £/T	% Diff 2018-2017
Bulk Cream	£1,840	£2,130	-14	£2,180	-18
Butter	£4,100	£4,750	-14	£5,050	-19
SMP	£1,380	£1,410	-2	£1,350	+2
Mild Cheddar	£3,000	£3,050	-2	£3,365	-11

Source: AHDB Dairy - based on trade agreed from 1st to 26th October 2018. Note these prices are indicative of values achieved over the reporting period for spot trade (excludes contracted prices)

- Butter is becoming less attractive to manufacturers due to the relatively high price of cream and butter stocks are thought to be plentiful. There is also thought to be less demand as food manufacturers are looking to reduce the use of butter as an ingredient due to its high cost.

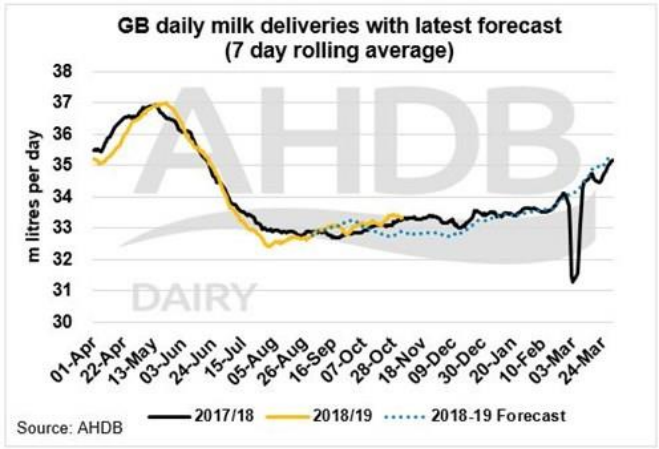
- AMPE, (based on butter, butter milk powder and skim milk powder), fell 11% from September and is 13.45 lower than it was 12 months ago. The butter component fell from 22.26ppl in September to 19.05ppl for October.

- MCVE (based on cheddar, whey powder and whey butter) faired much better for October, only back 2.9% from September and 10.8% lower than where it was 12 months ago.

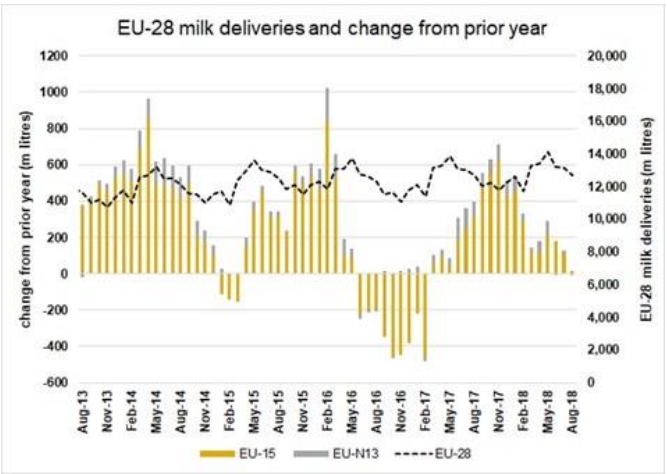
	Oct 2018	Sep 2018	12 months previously	Net Amount less 2ppl Haulage – OCT 18
AMPE	28.34ppl	31.84ppl	32.73ppl	*26.34ppl*
MCVE	32.66ppl	33.63ppl	36.61ppl	*30.66ppl*

Source: AHDB Dairy

UK Milk Deliveries and Global Production



- UK milk deliveries for the week ending 3rd November were back slightly (0.3%) on the previous week and 0.1% higher than the same week last year, equivalent to an extra 300,000 litres.



Source: AHDB Dairy

- Milk deliveries for the EU-28 were up marginally by 0.1% up in August compared to the same month last year and up 1.8% on the year-to-date compared to the same time period last year.

- The European Commission's short-term outlook for 2019 is predicting an increase in milk collections of 0.9%, on the back of sustained

demand for dairy products. Production of dairy products, in particular cheese, is expected to rise by 0.7% with increasing demand for both domestic use (+0.8%) and exports (+4%).

Monthly Price Movements for November 2018

Commodity Produced	Company Contract	Price Change from Oct 2018	Standard Litre Price Nov 2018
Liquid & Cheese	**Arla Farmers UK**	*No change*	31.21ppl liquid 32.37ppl manufacture
Liquid & Cheese	**Arla Direct**	*No change*	28.75ppl liquid 29.96ppl manufacture
Liquid & Brokered Milk	**First Milk Mainland Scotland**	*No change*	28.9ppl liquid 29.47ppl manufacture
Cheese	**Fresh Milk Company (Lactalis)**	*No change*	29.0ppl liquid 30.03ppl manufacture
Liquid & Manufacture	**Grahams**	*No change*	29.50ppl
Liquid & Manufacture	**Müller Direct**	*No change*	29.5ppl
Liquid & Manufacture	**Müller (Co-op)**	*+1.16ppl*	30.04ppl
Liquid & Manufacture	**Müller (Tesco)**	*+1.07ppl*	31.24ppl
Liquid, Powder & Brokered	**Yew Tree Dairies**	*No change*	29.50ppl Standard A litre price

- Arla are leading the way in raising the bar on standards for milk production with their new UK 360 programme. This programme has recently been trialled over the last 6 months by 79 farmers, and involves a higher set of standards compared to the red tractor scheme in the following areas: animal health and welfare, people/staff development, environmental and natural resources, engagement with the community and economic resilience and reinvestment. Aldi are working closely with Arla and have agreed to pay a premium to a select group of Arla farmers that comply with the new set of standards, thereby forming the Aldi Dairy Farm Partnership. The programme also aims to address the following areas: breeding calves with purpose, cow behaviour, waste reduction and recycling as well as data driven leadership. For the remaining Arla members, Arlågarden will still be regarded as the baseline standard.

- Müller was one of the first processors to announce a 1ppl cut from December, bringing its standard liquid litre price back to 28.5ppl, with reduced market returns from butter and cream being cited as justification for the price drop. Other price drops for December have since been announced, including Yew Tree Dairies and Grahams, both of which are also dropping 1ppl to 28.5ppl for their standard liquid litre. On the other hand, Lactalis have announced their current milk price will hold until at least the 1st January 2019.

- The latest annual cost tracker review by Promar for Tesco for the year up to March 2019 has revealed a 1.78ppl increase in variable costs, up to 18.41ppl. Overhead costs fell marginally by 0.12ppl to 11.22ppl and depreciation fell to 1.87ppl from the June 2018 review of 2.13ppl. Therefore the total cost of production was up by 1.4ppl to 31.5ppl before the adjustment for feed, fuel and fertiliser. This adjustment of -0.26ppl brings the TSDG quarterly milk price to 31.24ppl.

- The drought across Europe this summer has failed to materialise in lowered milk production. New Zealand have also had a good start to their milk year due to good grazing conditions, meaning that August production was 4.7% up on August 2017 (an extra 1.9 million litres more per day). With global production currently stable and falling butter and cream prices there is little optimism about improvements in farm gate milk price, which is greatly concerning given the rising costs of production.

- The German based research network (IFCN – International Farm Comparison Network) has released its Dairy Report for 2018 where it analysed 177 typical dairy farms in 53 countries. The results indicate that in 2017, numbers of dairy farms decreased by 1% and milk production per farm increased by 3.8%. There was a huge variation in the cost of milk production globally, ranging from $20 to $105/100kg of standardised milk.

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Straights Update

Straights prices for delivery in artic loads as of early November are as follows (varies depending on location):

£/T for 29t loads delivery + £8/t haulage to central belt	Nov 18	Dec 18	Jan 19 - Apr 19	May 19 - Sep 19
Proteins				
Hipro Soya	306	306	312	308
Rapeseed Meal	247	247	247	May-Jul 250
Wheat Distillers Pellets	POA	POA	POA	POA
Starch				
Wheat	180	180.50	181.50	May-Jul 183 Aug/Sep 164
Barley	182	182.50	184	May-Jul 184 Aug/Sep 144
Maize	182	182	182	186
Fibre				
Sugar Beet Pulp (10mm)	208	208	211	216
Soya Hulls	193	193	200	-

Source: Straights Direct and Cefetra on 13th November. Barley and wheat prices are based on delivery to central belt (for North-East, deduct £5/t for wheat), courtesy of Julian Bell, Senior Rural Business Consultant, SAC Consulting. Prices do not include seller's margin.

Global News

- The latest USDA report (8th November) has highlighted a sharp reduction in US soyabean ouput with production back 2.5mT. However, this has been offset by lower exports forecasted due to current trade issues between the US and China. Globally, soyabean output has been reduced by 2mT but with less demand expected, world stocks are set to rebuild.

- Sales of US soyabeans to China have fallen 94% from last year's harvest. It is likely that corn plantings will be up significantly next year and some analysts are predicting that as much as 4 million acres could be converted from soyabeans to corn in the coming spring.

- China's recent revision of stocks, domestic consumption, acreage and production has resulted in an extra 150mT of corn and 6mT wheat being added onto the global balance sheet. However, this would only impact markets if China started exporting. Excluding China, there is little change in global stocks compared to last month. Nevertheless, global grain stocks to use ratios have been falling, down 12 days from 88 days of supply in 2017 to 76 days in 2018. Wheat exports from the US and EU have been slow and with no current shortage, markets are tending to drift lower. The weaker pound on the risk of a 'no-deal' Brexit has helped limit the impact of weaker global prices on the UK.

UK and Scottish News

- Since the announcement of the Vivergo ethanol plant closure in September, the other plant (Ensus) on Teeside has since closed for maintenance for an unknown period of time. Ensus was producing a mixed distillers meal from wheat and maize and could use up to 1mT/year. This will reduce the demand for UK wheat but also means less distillers by-product available for animal feed. In Scotland, wheat used in distilling is thought to be down about 100,000t on last year and cheaper imported maize is taking some feed demand away. However the reduced cereal crop in Scotland could help offset reduced demand. Wheat output was down 80,000t to 807,000t and barley output was down 169,000t to 1,616,000t.

- Lower priced imports are the main danger to UK and Scottish wheat prices. If a surplus of UK grain remains and needs to be exported after March 2019, it would be subject to whatever trade arrangements are in place post-Brexit and it is currently unknown what these may be.

- The favourable weather conditions this autumn, along with strong forward wheat prices (relative to rapeseed in particular), are expected to have increased the UK and Scottish wheat acreage. This indicates a potential recovery in wheat output next harvest, weather permitting! Wheat prices for harvest 2019 have fallen about £15/t from their peak in July, and are currently at £158 to £160/t ex-farm in Scotland.

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Non-Dietary Factors and Milking Performance

Nutrition has a big role to play in milking performance, as well as influencing milk composition. While ration formulation is critical, there are several non-dietary factors such as housing and management of the feed bunk that can significantly influence milk output.

A study conducted by Bach et al (2008), where 47 herds in the North East of Spain were fed the same TMR, showed that non-dietary factors accounted for 56% of the variation in milk yield. These cows were of a similar genetic base (mainly Canadian origin) and yet average milk yield per cow within herd and day varied from 20.6 to 33.8kg/day (with an overall average of 29.3kg/day). Although exact feed consumption was not known as refusals were not measured, the variation in the amount of feed presented per cow ranged from 16.2 to 24.8kg DM/day over all the herds.

There was a difference in milk output between herds that pushed up feed and those that did not. For herds where feed was pushed up throughout the day (89% of herds), milk yield averaged 28.9kg, compared to only 25.0kg/day in herds where feed was not pushed up.

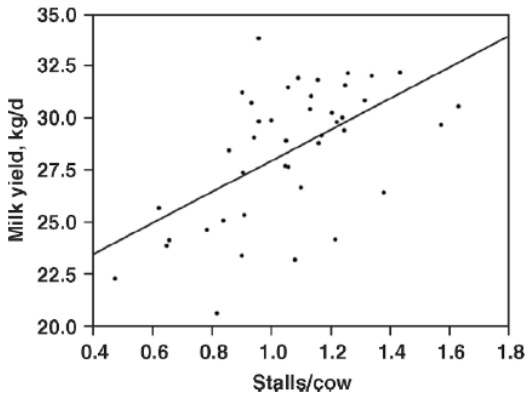
Nearly 60% of the herds in the study provided sufficient feed to ensure there were some refusals the next day and these herds averaged 29.1kg milk/day compared to only 27.5kg/day in the herds where there were no feed refusals.

No relationship was evident between feed space and milking performance, which was unexpected. The average feed space per cow was 69cm which could be considered adequate and fewer than 20% of the herds studied had feed space less than 50cm/cow.

Fifty-eight percent of the herds operated two dry cow groups, with a close up ration fed on average 11 days before the predicted calving date. Having a close-up ration showed no effect on average milk production. However, these herds tended to have a lower culling rate (35.7%) compared to herds with one dry cow ration (43.3%).

As well as feedbunk management (pushing up feed and presence of refusals) the other two main factors accounting for variation in milk production between herds was the number of cubicles available per number of cows and the age at first calving.

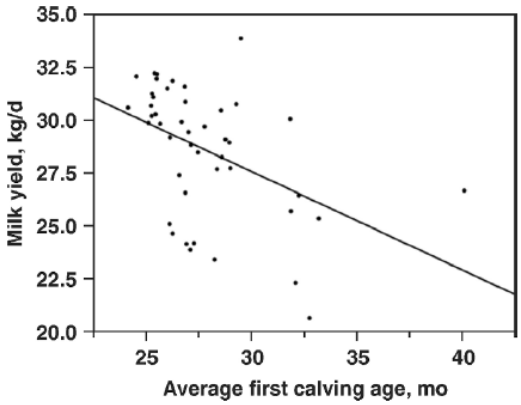
Relationship between Cubicles/Cow and Milk Production



Source: Bach et al 2008

The average age at first calving (AFC) was 27.7 months and there was a negative correlation between AFC and milk production.

Effect of AFC and Milk Production in Heifers Fed the Same Lactation Ration



Source: Bach et al 2008

This study highlights the significant effect that housing and feeding management have on milk output and that ration formulation is only part of the story in achieving good performance.

Many farms deliver fresh feed to the milking herd once a day but increasing this to twice a day can help increase feed intake, reduce the impact of ration sorting and therefore produce more milk. Presentation of fresh feed is the biggest driver to

stimulate cows to get up and eat. By encouraging cows to eat little and often, rumen pH remains more stable and this in turn helps improve feed conversion efficiency.

Reference: Bach, A., Valls, N., Solans, A. and Torrent, T. (2008). Associations between Non-Dietary Factors and Dairy Herd Performance. Journal of Dairy Science 91: 3259-3267.

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Yeasts – What could they do for you?

There are a vast array of yeast products for dairy cows on the market, some of which claim up to 2 litres/day improvement in milk yield and an increase in milk protein. So are these claims realistic?

Yeast is present naturally within the gut of ruminant animals and is important in the breakdown of fibre within the ration and maintaining a stable rumen pH. If a ration is well formulated to provide a good level of NDF and the rumen is functioning well, it could be argued that yeast products may have very little benefit. However, in times of stress such as in early lactation, hot weather or where there is a high disease challenge for example, benefits may well be realised. This years grass silages have been found to be a lot drier than last year with a fairly high pH, making them more susceptible to secondary fermentation. Mycotoxins from mould growth on silages in high producing animals may reduce overall performance. In addition, this year many dairy farmers may be short on silage so may well feed a higher concentrate level. This could negatively affect rumen pH, so a yeast product may be well worth considering.

Over the years, many scientific studies have been carried out on yeast products showing that specific strains of yeasts do have an effect on production characteristics at different stages throughout lactation. In early lactation, Wohlt *et al*. (1991) found when using a live yeast strain that early lactation cows produced more milk per day (29.5kg/d V's 28.7kg/d) and reached peak lactation earlier. A more recent study analysing 14 research trials involving 1615 cows showed that live yeast improved milk yield by 1.15kg/day and that the response to yeast was greater in the first 100 days of lactation compared to cows over 100 days in milk (De Ondarza et al, 2010). Also, yeast fed to cows during the close up dry period will produce more milk throughout the coming lactation. Therefore, feeding yeast products may be beneficial within close up dry cow and high yielding dairy cow rations.

Dairy calves in the first 2 months of life can also derive many benefits from being fed yeast products, such as higher dry matter intake, better rumen development and enhanced growth. Health benefits such as a lower incidence of fever and scours and reduced calf mortality have also been seen in dairy calves when fed yeast products.

There are two main types of yeast products available, live yeasts and fermented yeast cultures. Live yeasts act within the rumen by scavenging oxygen, creating a more anaerobic environment favourable for the natural rumen microbes to flourish. They are also proven to have a stabilising effect on rumen pH by stimulating the growth of bacteria that utilise lactic acid, reducing its concentrate in the rumen. Live yeasts have also been found to produce growth factors including organic acids, B vitamins and amino acids, which are known to improve feed conversion efficiency further.

With fermented yeast cultures, the yeast has already undergone fermentation under carefully controlled conditions during manufacture to maximise the production of growth factors. It is these growth factors that stimulate growth of beneficial rumen bacteria that improve digestion and feed conversion efficiency. Therefore fermented yeast products do not have the oxygen scavenging effect. However they are still well proven to give benefits in animal performance.

In more recent times, further research into yeast strains has been carried out to determine whether methane production from high performing animals could be reduced. These strains of yeast are not as efficient at stabilising rumen pH but in the future may be able to reduce greenhouse gas emissions from ruminant livestock.

To conclude, taking into account silage quality this coming winter, yeast products may provide a slight lift in production or mitigate potential checks in performance. When buying a live yeast product it is essential to choose a product with a high concentration of yeast cells (expressed as CFU or

colony forming units/kg and to feed according to the manufacturer or your nutritionist's specified feed rate to ensure maximum benefit.

Reference: De Ondarza, M.B., C.J. Sniffen, L. Dussert, E. Chevaux, J. Sullivan and N. Walker. 2010. Case Study: Multiple-Study Analysis of the Effect of Live Yeast on Milk Yield, Milk Component Content and Yield and Feed Efficiency. The Professional Animal Scientist 26: 661-666.

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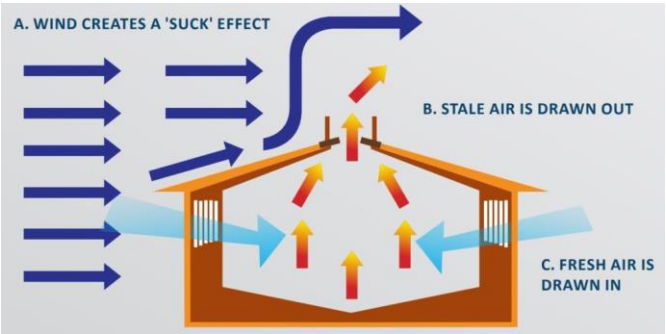
Ventilation in the Calf Shed

We are approaching the time of year where problems with calf pneumonia tend to increase. Adequate ventilation in the calf shed is crucial for minimising pneumonia risk by providing fresh air and reducing moisture and humidity. However, air speed must be controlled to reduce drafts and prevent calves from getting a chill.

Adequate air inlets and outlets are the key to good ventilation as calves under 2 months of age do not produce sufficient heat to drive the stack effect (see diagram below). A calf will breathe out about 1 litre of water vapour each day into its environment. If warm, moist air cannot escape through the roof of the building, it will stagnate and fall back down onto the bedding. As a result, humidity will increase and create favourable conditions for pathogens to thrive. Relative humidity should be below 75%, as above this, the risk of pathogen spread between calves increases, as viruses and bacteria can survive for several minutes. Below 75% relative humidity, viruses die off very quickly after exhalation.

Effect of Good Ventilation on Airflow



Source: Teagasc

Air space is also critical and there should be no more than 50 calves sharing the same air space. Health risks increase with a greater number of calves in a single air space. Recommendations are as follows:

Air Space for Calves

Age	Air Space
Birth	$6m^3$
2 months	$10m^3$
6 months	$15m^3$

Source: NADIS

Even old calf buildings with low roofs can be adequately ventilated if modified appropriately and opened up to have the correct inlet and outlet space. The rule of thumb is to have $0.04m^2$ per calf (up to 100kg) for air outlet in the roof and at least twice as much air inlet on the side walls. Ideally the walls should be solid up to at least calf height (ideally 1.5m high) to prevent draughts at calf level. The outlet should be at least 1.5m higher than the ventilation inlet.

Air speed should be no more than 0.5m/s as drafts can cause stress and reduce immunity. As air speed increases, the calf's lower critical temperature (LCT) increases, meaning that more energy is required for the calf to keep warm. An airspeed of 2m/s can increase the LCT by 9°C.

It is not only infectious pathogens we need to be concerned about. Dust and gases can also have harmful effects as dust can irritate the respiratory tract and mucous membranes, potentially leading to permanent lung damage and increased susceptibility to infection. For this reason, use of straw blowers are not recommended for bedding calves.

Good drainage is just as important as ventilation to help control air quality and moisture in the building. Concrete floors require a gradient of 5% (1 in 20) for good drainage from beds, which will help reduce the build up of ammonia. Crouch down to calf level and if you can smell ammonia, the building is not well ventilated. Studies have shown that the age at first calving is severely affected by ammonia levels during the first 4 months of life.

Smoke pellets (available from plumbers' merchants) can be used to assess airflow in a building. The smoke should clear within two minutes, rising and escaping through the outlet area. If longer, try and make modifications to the

inlet and outlet areas and if this is not possible the alternative is to invest in mechanical ventilation.

Recommended building dimensions for effective ventilation are as follows:

- Outlet area should be at least 0.04m^2 per calf or 2m^2 per 50 calves.
- Inlet areas should be at least 2, if not up to 4x the outlet area.
- Outlet should be a minimum 1.5m higher than the ventilation inlet.
- Roof profiles of 1:3 and 1:4 are ideal.
- For every 3m width of building there should be 5cm of ridge opening.
- Roof pitch recommendation of 22°.
- Ideally building width no more than 10m. It can be difficult to get even air flow across wider buildings.

Making Best Use of Slurry

With the majority of cattle housed for the winter now, spring fertiliser is in full production, both organic and inorganic. Knowing how much slurry will be produced over the winter will give an idea of the volume of organic manures available for the spring application. This should allow better planning in the spring to ensure efficient nutrient applications and reduce the over application of nutrients, especially purchased nutrients.

As most farmers are aware, slurry, although a waste, actually has a financial value to the business due to the readily available nutrients which it contains. A typical analysis of mixed slurry is shown in the table below:

Nutrient Value of Mixed Slurry

Nutrient	Value
Dry Matter %	6.4
Kg Nitrogen/m³	2.7
Kg Potash/m³ (K_2O)	3.2
Kg Phosphate/m³ (P_2O_5)	1.9

Source: SAC Consulting average analysis

With the use of this analysis and the cropping plan for the coming year, the business can plan the best fertiliser to purchase, be it straights or compounds. The cropping plan must include the crop to be grown and the number of cuts or grazing cycles to be taken.

Ideally the fields should be sampled to assess the pH, available potash and phosphate. This will give an accurate guide as to the nutrients readily available in the soil to be supplied.

Depending on the current practice of the business there is the potential for significant financial savings through the efficient use of organic fertilisers produced on farm. Using the SRUC Crichton Royal Farm in Dumfries as an example, with targeted application of nutrients, the farm reduced its purchased nitrogen by half over a 10 year period.

When applying slurry the following General Binding Rules must be followed to prevent any penalties to subsidy:

- Leave a 2 metre boundary from the top of the banking, before starting any cultivation works near a watercourse. From the first of January 2019 this will also apply to cultivations within 2m of a hedge.
- Significant poaching should be prevented within 5 metres of a watercourse.
- No fertiliser applications, cultivations or livestock within 5 metres of a spring, well or borehole.
- Slurry or manure applications, livestock feeders and the storage of fertilisers should not come within 10 metres of a watercourse.
- No storage of manures or applications of slurries or manures within 50 metres of a spring, well or borehole.

Providing the business is not situated within a Nitrate Vulnerable Zone (NVZ), farmers must ensure the fields are not waterlogged, frozen or snow covered and the nutrients applied do not exceed the crop requirements before applying. If the farm is within the boundaries of a NVZ then the closed periods and annual nitrogen limits must be observed.

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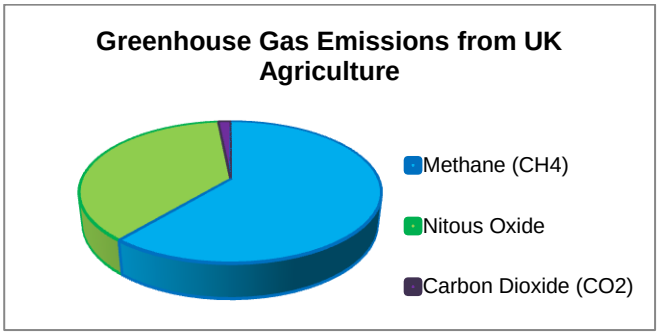
Enteric Methane Production and Reducing Energy Loss

Nine percent of the UK's greenhouse gas (GHG) emissions come from agriculture with the majority of this being in the form of methane (CH_4), which has 25 times more global warming potential than carbon dioxide (CO_2). The breakdown in GHG emissions from agriculture is as follows:



Source: Agricultural Industries Confederation

The majority of the methane produced in agriculture comes from the gut of ruminant livestock with the remainder coming from manures. Cattle produce the most methane of which 90% comes from rumen fermentation and this is mainly excreted via the mouth.

In the rumen, forage is broken down to acetate and this releases hydrogen which is converted by Archaea microbes to methane using carbon dioxide. This hydrogen must be removed from the rumen or it will cause a reduction in fibre digestion leading to digestive upsets due to it decreasing ruminal pH. In contrast, when starch is broken down to propionate in the rumen no methane is produced. Therefore rations with a high proportion of forage will produce the highest levels of methane.

The process of converting hydrogen to methane costs the animal vital energy which could be used for milk production and growth. Therefore a great deal of research is now being carried out into reducing methane production in the rumen for both economic and environmental reasons.

On individual farms the amount of methane produced per cow depends on a number of factors:

1. Dry matter intake (DMI): As DMI increases so will methane production.
2. Diet composition: Rations with high levels of forage will increase methane production.
3. Animal variation: Individual animals will produce varying amounts of methane depending on genetics for example.
4. The use of methane inhibitors: Methane inhibitors can be fed but they tend to work by reducing DMI as opposed to reducing the methane produced from the digestion of forage.

On a herd basis, the more efficient the individual cows are, the less cows are required to meet the desired production volume, therefore less methane is produced overall.

The type of forage fed can also make a vast difference to the amount of methane produced by individual animal. In Scotland, the majority of dairy cows will be fed grass based forages which have higher levels of energy coming from fibre as opposed to starch in wholecrop and maize silages.

As grass matures it lignifies, thus reducing its digestibility and increasing its NDF (neutral detergent fibre) content and this will increase the amount of methane produced.

	Grass Silage (More Leafy when Cut)	Late Cut Grass Silage (More Mature when Cut)
Energy Corrected Milk Yield (kg/d)	24.8	21.8
Methane (l/d)	539	542

Source: Agriculture Industries Confederation

Cows fed grass silage cut at a more leafy stage will produce slightly more milk and produce slightly less methane. If maize silage was the basal forage in the ration used in the above example where grass silage is the basal forage, energy corrected milk would be higher at 26kg/d and methane production would be lower at 495l/d. Therefore, if wholecrop or maize silage could substitute some grass silage within the ration this would be beneficial in reducing methane production.

Straights such as peas and beans tend to produce higher levels of methane as opposed to distillery by products such as distillers dark grains. This is due to the higher proportion of energy coming from fibre in the peas and beans.

Another method which has been tested for reducing methane production in cattle is increasing the level of dietary fat. This should be done with extreme caution and under the close supervision of a nutritionist as high levels of fat within the rumen can cause digestive upsets. Avoid feeding over 6% in the dry matter, with no more than 2.5% of total dry matter intake coming from rumen protected fats.

Improving conception rate and cow longevity has also been shown to reduce overall methane production per litre of milk produced per cow. Improving conception rate alone can reduce overall methane production per litre of milk by as much as 25%.

Methane production from cows is starting to be researched more and more with a potential drive for agriculture to have greener credentials in terms of GHG emissions. Currently many milk companies are now encouraging carbon footprints to be calculated as part of their milk contracts so reducing methane production may feature in the future.

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Dates for your Diary

- 19th - 20th November - **Next Generation Dairying for Scotland.** Moredun Research Institute. Event organiser: http://www.hannahresearch.org.uk/

- 21st November - **AgriScot**. The Royal Highland Centre, Ingliston, Edinburgh, EH28 8NB.

- 21st November - **Pedigree Holstein Cattle Show and Sale**. Borderway Mart, Rosehill, Carlisle, CA1 2RS.

- 27th November - **Dairy Leader Development Programme - Practical Team Management Skills and Strategies.** Hetland Hall Hotel, Carrutherstown, Dumfries, DG1 4JX. Time 09.00-17.00. Event Organiser: Karen O'Callaghan-Lowe, t: 07759586321, e: Karen.OCallaghan-Lowe@ahdb.org.uk

- 29th November - **Feeding Signals**. Beuchan Farm, Keir, Thornhill, DG3 4DJ. Time: 11.00-13.00. To book contact the KE Events hub on 01904 771216 or email ke.events@ahdb.org.uk

- 3rd - 5th December - **DIY AI Course.** Aberdeenshire. Event organiser: Embryonics t: 01606 854411, www.embryonicsltd.co.uk

- 4th December - **Strategic Dairy Farm Meeting: Feeding the High Yielding Dairy Cow**. Tinto Hotel, 44 Biggar Road, Symington, Nr Biggar, Lanarkshire ML12 6FT. Time 10.45-14.30. To book your place contact AHDB KE Events Hub on 01904 771216 or ke.events@ahdb.org.uk

- 8th December - **The Black and White Sale**. Borderway Mart, Rosehill, Carlisle CA1 2RS.

For any further enquiries regarding the information in this newsletter please contact:

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