Maximising the power of silage

by Sylvie Andrieu,
European Technical Ruminant Manager, Alltech

Home grown forages represent a large proportion of the typical cow's diet. The quality of these forages, including silage, is one of the key ways in which the farmer can reduce the cost of production. Three major challenges associated with silage are dry matter loss, quality (retaining important nutrients) and palatability. Making silage can be compared with piecing a puzzle together.

Following best practices can help overcome the challenges listed above, ensuring the end product is a high quality feed and reducing the need for expensive feed supplementation. These 'pieces' include harvesting at the correct maturity and moisture level, packing density, removal of oxygen, managing the pit-face and use of inoculants.

Dry matter loss

In the case of forages, dry matter loss occurs when bacteria break down and consume the forage, converting it to carbon dioxide, water, heat and other by-products.

In order to minimise losses, as much oxygen as possible must be excluded, resulting in a pH drop, which helps to destroy these bacteria. The more rapid the pH drop, the more rapidly these bacteria become inactive, resulting in more forage dry matter available to feed.

Using a silage inoculant that contains a combination of lactic acid bacteria (LAB) and enzymes can help reduce dry matter loss.

Lactic acid bacteria use sugar released by the enzymes to produce lactic acid, which reduces the pH quickly, thus speeding up the fermentation process and reducing losses.

Increased protein quality

In order to access nutrients, bacteria present in silage break down the proteins of the fresh crop into amino acids and ammonia reducing the amount of true protein remaining in the silage. The longer the pH level remains high, the longer these undesirable bacteria continue to reduce true protein. Ultimately, this 'lost' protein in the silage will have to be replaced with purchased protein. Using an inoculant ensures a more rapid drop in pH, resulting in reduced true protein loss.

Palatability

Palatability is key to maximising forage intake. Poor fermentation can result in the production of butyric and acetic acid, which can lead to reduced intakes. Maximising the amount of lactic acid produced and minimising the amount of acetic or butyric acid results in more palatable silage. Inoculants containing homo-fermentative LAB (where only lactic acid is produced) helps achieve a more ideal ratio of lactic to acetic acid.

Making silage sense

Improving cow health and performance, as well as the producer's bottom line can be achieved by placing more emphasis on making higher quality silage and reducing losses. Using modern management practices and technologies, such as inoculant will assist in carefully piecing the complicated silage puzzle together and overcoming common challenges, thus increasing the overall quality of silage and the feed presented to the cow. ■

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Ready to cope with heat stress?

By Dr Sylvie Andrieu,
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Heat stress not only affects dairy cattle in the Mediterranean and Central European areas but also in more temperate countries like the UK, Germany, and France, for a period of weeks to months every summer.

Heat stress is a result of the combined effects of elevated ambient temperature and humidity, which compromises the cow's ability to dissipate body heat.

Biological effects

Heat stress mainly affects performance through a reduced feed intake, which is associated with reduced rumination and buffer content in saliva.

These effects add up and result in a negative energy balance situation, with the potential for ruminal sub-acidosis. High producing cows, those with high ingestion or activity, are more susceptible to heat stress.

Heat stress mainly affects milk yield and milk fat percentage, but it also lowers feed intake, reproductive performance, and often bodyweight.

When occurring before insemination, it is associated with decreased fertility in cattle which can continue well after temperatures have cooled down.

The damaging effects of heat stress can be detected after a few days of exposure, thus the application of appropriate management strategies is necessary.

Housing, management, and nutritional modifications can be implemented to address the challenges of heat stress.

Housing management

- Keep cows inside during the day.
- Provide shade (feeding areas, pasture).
- Provide extra air movement by using fans, sprayers in barns and holding areas.
- Increase sanitation during hot, humid weather.
- Make sure ration is balanced for dry cows and springing heifers to minimise infectious and metabolic diseases.

Nutritional management

The main goal of nutritional management during heat stress is to maintain healthy rumen function, while increasing the energy supply to limit the negative energy balance.

This relies mainly on providing highly digestible feed, while maintaining a safe forage to concentrate ratio.

Key areas to focus on are as follow:

- Use high-quality forages. The forage quantity fed to dairy cows can be slightly increased by the use of Optigen.
- Add extra water to the TMR.
- Increase the mineral concentration to compensate for electrolyte losses.
- Feed the ration during the cooler hours.
- Feed ensiled ingredients more frequently to compensate for shorter bunk life.
- Add fat to the diet.
- Keep water cool.
- Support rumen microflora activity by including Optigen.
- Use Yea-Sacc^{1026} which has been demonstrated to increase dry matter intake and milk production during heat stress. ■

Managing udder health

By Dr Sylvie Andrieu,
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The impact of udder health on performance and profitability is well known by dairy farmers and the estimated cost of a clinical case is around €200. Although there are many causes of mastitis, bacterial infection is responsible for around 70% of cases. Mastitis causing organisms usually invade via the teat canal and progress into the mammary gland, attempting to colonise the udder tissue. An animal's ability to suppress invading pathogens relies on its immune system competency.

Therefore, the goal is to prevent or minimise new infections as re-infections are notoriously difficult to avert. Dry cows are the greatest risk group for new infections so a clean environment and an appropriate ration that supports immune function are essential.

The role of minerals in immune system functioning is well known, especially selenium, copper and zinc. As their levels in the blood usually drop sharply around calving, animals are then more susceptible to infection.

Offering a highly bio-available dietary form of selenium helps ensure an optimal selenium status.

Feeding Sel-Plex (Alltech Inc) results in more selenium absorbed and retained in the animal's tissues compared with inorganic Se.

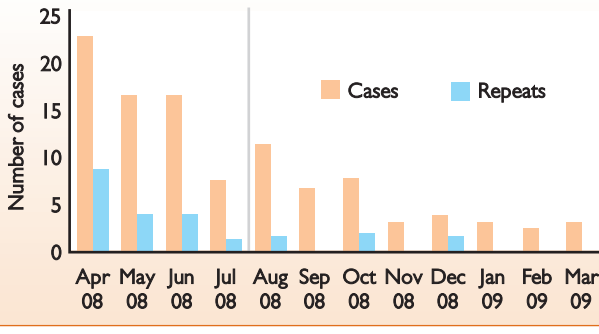
This selenium 'reservoir', specific to organic sources, is more readily used by immune system components. For example, white blood cells from animals fed Sel-Plex selenium only, had greater 'killing' ability and survival, compared with animals offered the same level of sodium selenite.

Copper benefits the immune system by improving resistance to E. coli infections. In one trial, dairy cows supplemented with Bioplex Copper (Alltech inc) had lower E. coli numbers in the udder following infusion than when fed with inorganic source.

When fed during the dry period as the unique source of selenium, zinc, manganese and copper, Bioplex and Sel-Plex minerals significantly reduced mastitis incidence in a UK dairy herd while significantly improving fertility parameters.

Promoting a competent immune system is critical to reducing the risk of udder health problems. Feeding a 100% organic mineral supplement, such as Alltech's Mineral Advantage series, will allow the dairy cow to build reserves to sustain health and performance. ■

Fig. 1. Effect of total replacement of inorganic zinc, copper, manganese and selenium with Bioplex and Sel-Plex minerals on the number of mastitis cases by months of calving.



Protein supplementation efficiency

By Dr Sylvie Andrieu,
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One of the major challenges of the dairy cow nutritionist is to provide the cow with the required nutrients for production, health and reproduction but also ensure the diet provides enough structural fibre to stimulate rumination and secure rumen function.

However, the more grains that are used in a ration the less available space there is for forage and fibre sources, which can compromise rumen health and efficiency.

Rumen bacteria have varying requirements for protein sources.

The fibre digesters have an almost exclusive requirement for ammonia.

Traditionally, dairy diets result in variation in rumen ammonia levels which means periods of excess and deficiency.

This is particularly evident when the diet is supplemented with urea.

As all the urea entering the rumen has disappeared 20 minutes post-feeding, there is a drop in the non-protein nitrogen (NPN) source available for microbes.

Using a feed ingredient specifically designed to maintain a constant supply of ammonia, such as Optigen (Alltech Inc), is one solution to the problem.

Optigen can be reformulated into dairy cow rations to result in increased bacterial growth and microbial protein supply to the animal.

Additionally, Optigen inclusion in partial substitution for other vegetal protein sources opens space in the diet that can be filled with more rumen friendly materials, like home-grown forages, also allowing more energy into the diet.

Researchers in Portugal demonstrated over two litres extra energy-corrected milk when Optigen was reformulated into the diet.

When vegetable protein sources were partially replaced by Optigen with an increase in the level of forage in UK diets, the animals were seen to use their ration much more efficiently (Table 1).

Practical evidence of increased efficiency can be seen in the manure where animals fed Optigen consistently excrete fewer undigested particles.

The challenge of supplying sufficient energy and protein without compromising rumen health is one of the major issues for today's dairy nutritionist.

By providing feed ingredients that maximise rumen efficiency the cow is able to put more into producing milk, without compromising her performance. ■

	Control	Optigen	P-value
Nitrogen			
Intake (g/d)	619	581	<0.001
N-milk output (g/d)	165	162	0.427
N efficiency	0.267	0.281	0.002
Energy			
ME intake (MJ/d)	275	264	0.067
ME output (MJ/d)	251	262	0.155
ME efficiency	0.914	0.997	<0.001

Table 1. Effect of reformulation with Optigen at the expense of vegetable protein sources on nitrogen and energy efficiencies (Sinclair et al., 2008).

Locomotion and profitability

By Dr Sylvie Andrieu,
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No foot, no horse. This phrase is well known in the equine industry and relates to the fact that a lame horse cannot perform as a sound animal.

This is also true of dairy cows, as lame cows will negatively impact production and profitability – the estimated cost of a single case of lameness is €230.

Lameness has economical, as well as health and welfare implications; not only can there be reduction in milk yield, but also in fertility as heat detection is more difficult.

This can result in missed chances for getting the animal back in calf, an extended calving interval and reduced profit.

There are numerous causes of lameness, from physical trauma to bacterial infection but all result in reduced locomotion and discomfort. Hoof health is a multifactorial issue, but there are general management steps to help minimise the risk of lameness.

Attention to the animal's environment should include:

- Avoiding slippery floors, passageways and walkways.
- Soft, deep and clean bedding in cubicles of an appropriate size.
- Dry loafing areas should be provided.
- Slurry should be removed frequently from passageways.
- Keeping the claws dry is key to reducing bacterial infection.

Diet and nutrition can have a major impact on hoof health and lameness.

Ensuring optimal supply of minerals, such as zinc, selenium and copper is essential. To this end, using a highly bioavailable source of these minerals, that is well retained in the body, provides a reserve that the animal can use in times of physiological stress.

Dietary inclusion of organic zinc (Bioplex Zinc, Alltech Inc) significantly ($p<0.05$) reduced claw deterioration and increased claw hardness compared with zinc oxide.

High levels of dietary selenium in the form of sodium selenite have been associated with sloughing of the outer part of the hoof, as excess selenium interferes with hoof proteins.

Feeding Sel-Plex (Alltech Inc) can aid with increasing selenium levels in the body without the deleterious effects attributed to sodium selenite supplementation.

Laminitis is a common problem in modern dairy herds and it is frequently associated with subacute ruminal acidosis (SARA). Promoting a stable and efficient rumen is essential to reduce the risk of SARA.

Inclusion of Yea-Sacc (Alltech Inc), a live yeast, in the diet of dairy cows has been regularly shown to increase rumen pH and is therefore part of a successful feeding programme for a healthy rumen.

Overall, a programme to promote healthy claws should take into account all aspects of management.

Interactions between genetics, the environment and diet can make it a difficult issue to control, making prevention better than cure. ■