BEWITAL agri
specialist in milk & fat

DAIRY COW FEEDING

Basics and recommendations for the supply of dairy cows.

“The dairy cow´s life effectiveness is based largely on the optimal supply of energy.”

Introduction

Healthy, long-lived and productive dairy cows - that‘s what dairy farmers want. But finding the right balance between health, performance and efficient feeding is a challenge for many farms.

Increasing daily milk yields across the entire dairy herd are leading to sharply rising feed requirements, particularly in terms of energy supply. Particularly in the first third of lactation, energy deficiencies quickly lead to subsequent health and fertility problems.
Currently, the average dairy farm only reaches just under three lactations.

To improve the economics of milk production in the long term, it is important to consider not only high milk yields but also the productive life and lifetime productivity of dairy cows. Recent economic analyses combine these values in lifetime efficiency as kg milked per day of life.

‘An optimal energy supply is the key to a high lifetime efficiency of dairy cows and is the prerequisite for the economic success of farms,’ emphasises Dr Michael Hovenjürgen.

Dr Michael Hovenjürgen
Research and Development
BEWITAL agri GmbH & Co. KG

Foto: Agrarmotive

Content

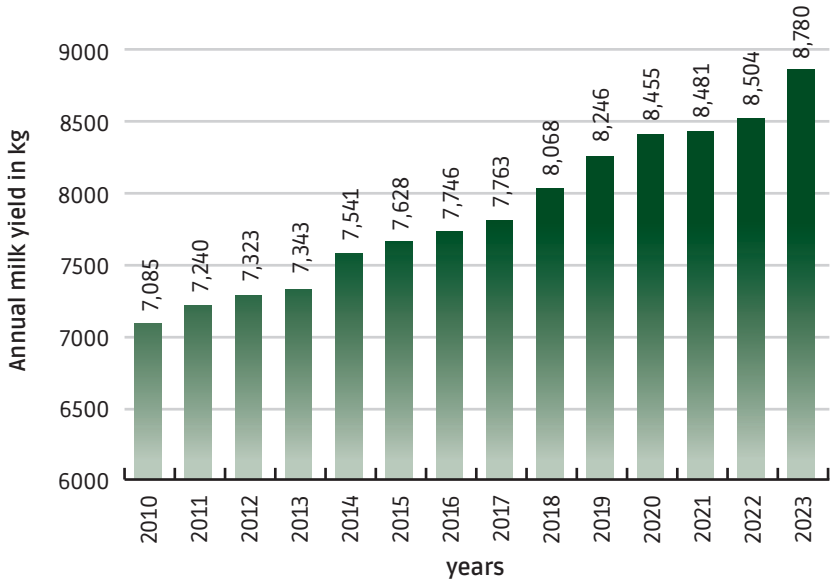
1 | BASICS

1.1 Development of milk yield

Milk yield has increased enormously through performance development in breeding. This is especially clear when examining the developments of milk yield over the last years as recorded in the German Herd-Book.

Development of individual animal milk production in Germany

(Statista, 2024)



Recent considerations in the breeding industry suggest that the genetic potential of cows lies above 16.000 kg. This development represents a major challenge in the animal nutrition industry, as an increase in milk yield leads simultaneously to an increase in ration and energy requirements.

The nutritional requirements of dairy cows must primarily be covered by feed intake. Additional energy from mobilisation of body fat is limited. Increasing the energy concentration should not lead to overloading the rumen with rapidly available carbohydrates.

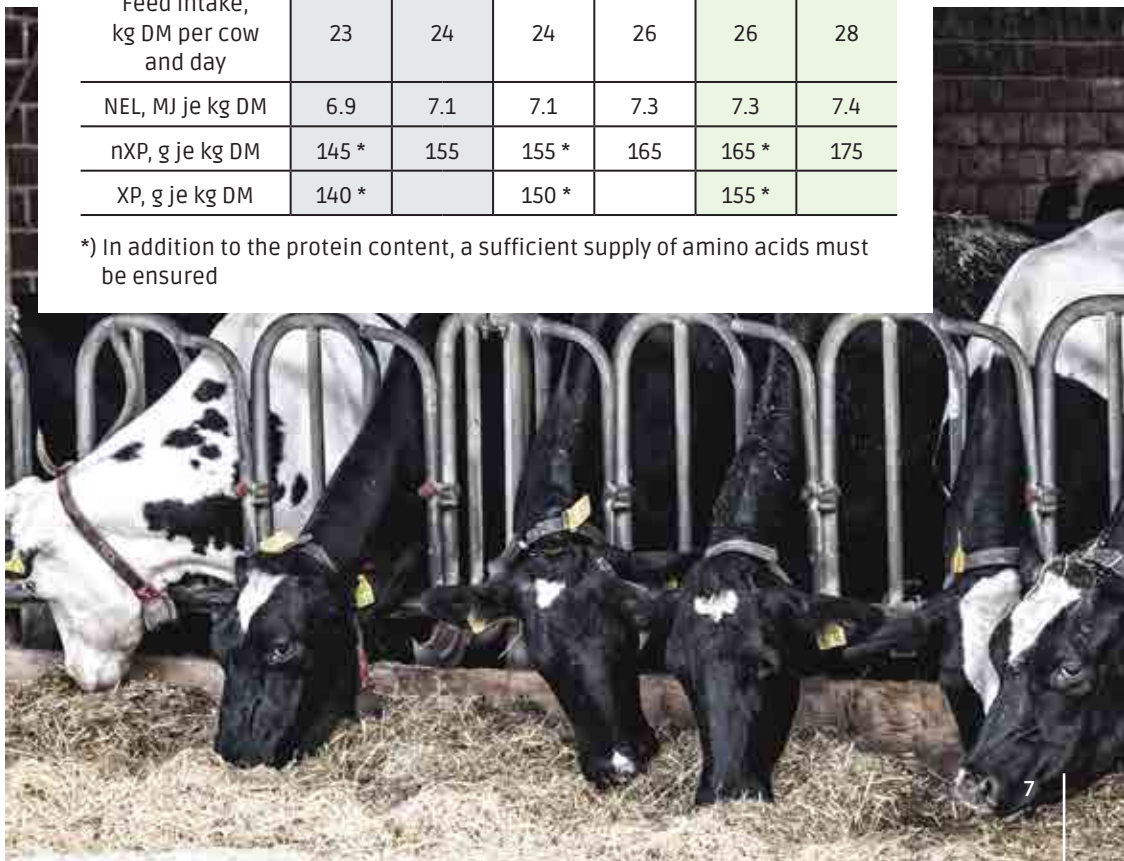
When optimising protein supply, it is important to ensure that cows have an adequate supply of amino acids, especially when milk yields are high.

Recommendations for mixed rations for fresh milkers and high-yielding cows

(DLG, 2023, mod.)

Herd performance	8,000 kg/cow and year		10,000 kg/cow and year		12,000 kg/cow and year	
Milk yield, kg per cow and day	37		42		47	
	from	to	from	to	from	to
Feed intake, kg DM per cow and day	23	24	24	26	26	28
NEL, MJ je kg DM	6.9	7.1	7.1	7.3	7.3	7.4
nXP, g je kg DM	145 *	155	155 *	165	165 *	175
XP, g je kg DM	140 *		150 *		155 *	

*) In addition to the protein content, a sufficient supply of amino acids must be ensured



1.2 Rumen health

High-yielding cows can only be supplied with enough energy to fulfil their needs if the energy density of the ration is correspondingly high. This can be achieved by using high energy quality silage and other concentrates. However, the proportion of concentrates can only be increased to a limited extent. Otherwise the risk of rumen acidosis increases.

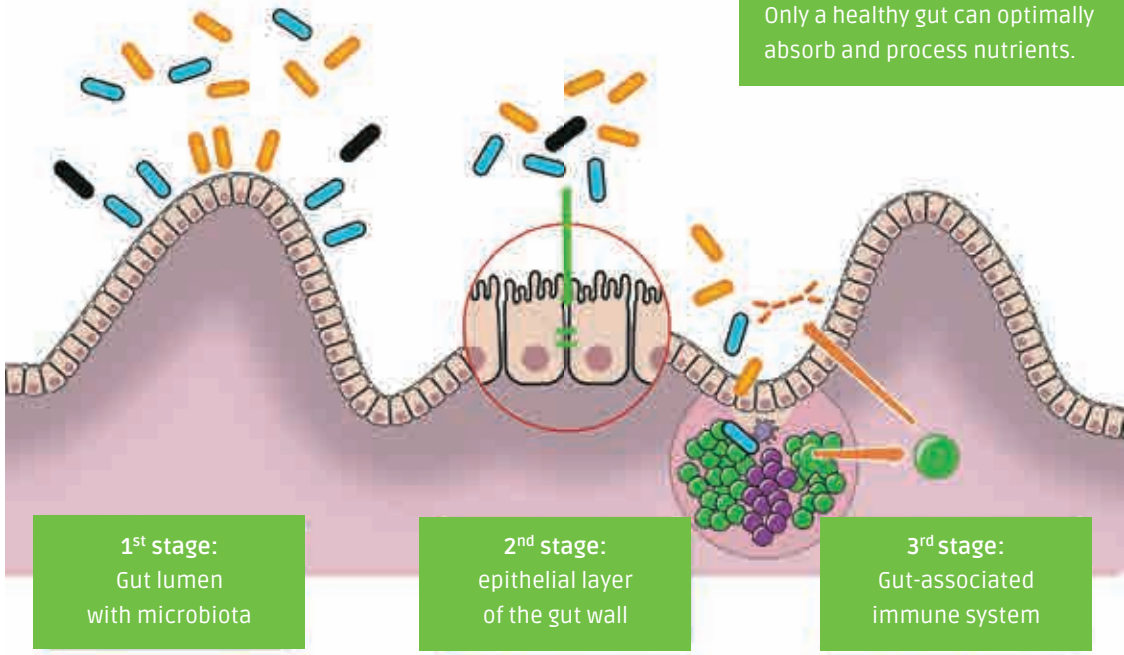
The following problems may occur:
- Reduction of milk fat content
- Sub-acute ruminal acidosis (SARA)
- Clinical acidosis

1.3 Gut health

70 to 80 percent of an animal's immune system is located in the gut. So the gut plays a key role in health and performance. Therefore, our primary goal should be to promote healthy intestinal development as early as possible and to maintain it afterwards.

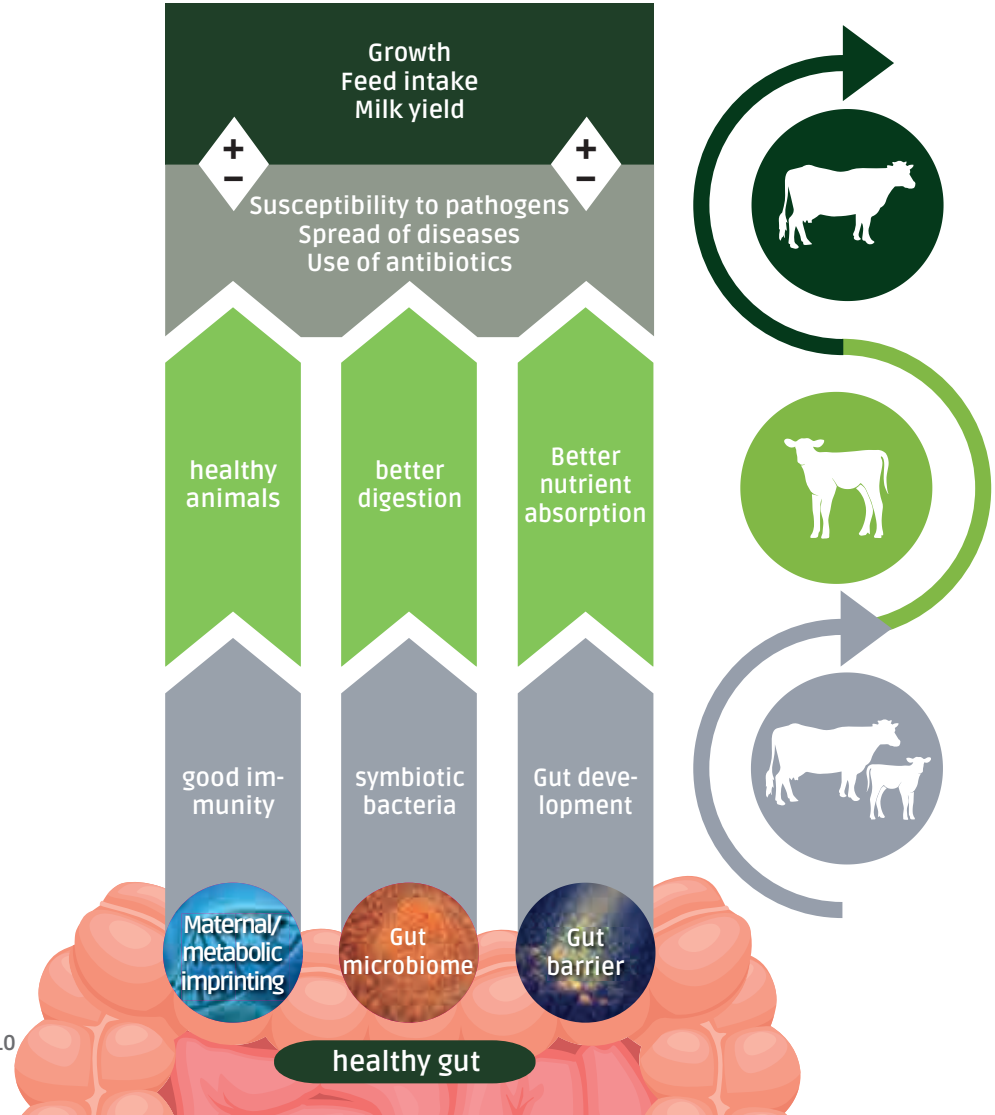
A healthy intestinal flora and an intact gut barrier also prevent endotoxins from entering the bloodstream and having a negative impact on the metabolism. Optimum metabolic health of dairy cows is the most important factor for economic milk production.

Only a healthy gut can optimally absorb and process nutrients.



1.4 „Gut it!“

A healthy gut contributes significantly to high milk yield and good fertility. It also contributes to the well-being of the cow and therefore to animal welfare.



1.5 Principles of energy supply

First class quality ration is essential for today's high-yield cow. The crucial factor is the supply of energy. Disruption in this supply can lead to a reduction of body reserves. A high mobilization of body fat for instance has a negative effect on the animal´s health and therefore also on milk yield. The energy requirements of high performance cows can only be covered through the use of high-density ration. Fats have the highest energy density of all feedstuff making them an essential component for the upgrading of ration.

High quality vegetable fats serve as special energy suppliers.

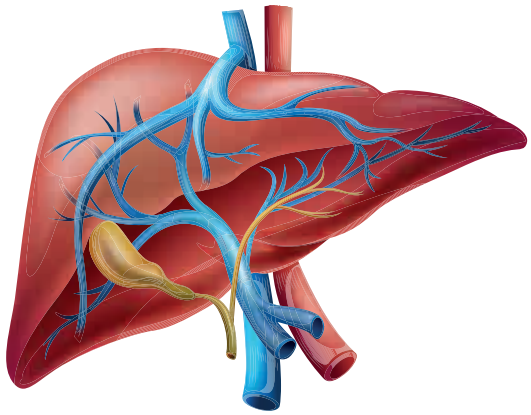
Especially in stressful situations or phases of high performance (e.g. early lactation), it is essential that the supply of energy remain constant in order to avoid affecting the function of the rumen.

1.6 Energy metabolism and health

The first third of lactation is a critical time for high-yielding cows. During this period, milk yield, as well as the demand on energy, are at a peak. In contrast however the actual ration intake has not yet reached maximum after calving. This is why cows are often not able to cover their energy demand, thus leading to an imbalance of energy.

If the high energy requirements for milk production and metabolic processes cannot be covered, the cow begins to lose body mass. This results in metabolic products that place a heavy burden on the liver. Furthermore, the impairment of liver function leads to metabolic problems that result in fertility problems and a weakening of the immune system.

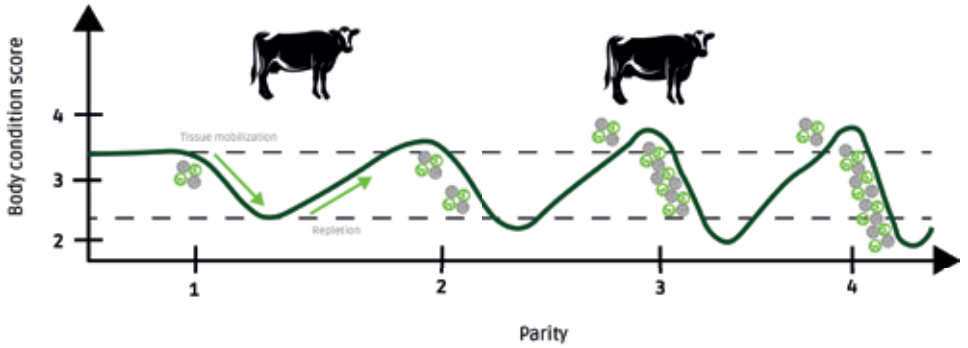
The liver is the cow's **„fertility organ"**.



The metabolic processes that take place in the fatty tissue during dissolution/mobilisation are directly related to the development of immune cells in the fatty tissue. This is a sign of an inflammatory reaction.

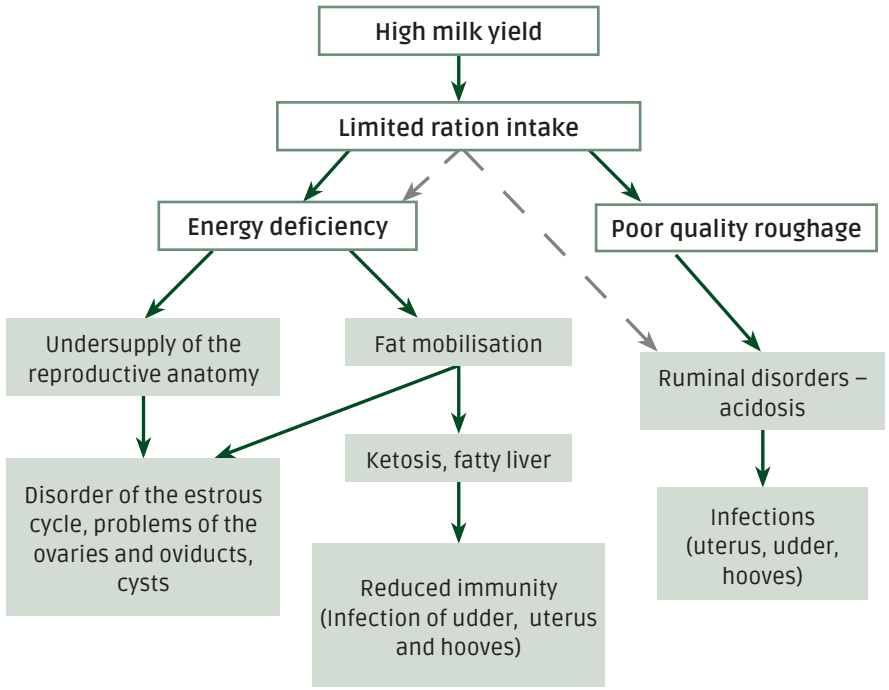
In the course of the next lactations and the recurring fat mobilisation, this leads to an increased recruitment of immune cells and thus to an increased inflammatory reaction. Many cows are known to experience an increase in BCS fluctuations as the number of lactations increases. In the fourth lactation, the number of immune cells may have reached a level at which the metabolic and immunological effects of the inflamed fatty tissue become visible. The cow's resistance to the stresses associated with a high milk yield is then significantly reduced.

Increased fat mobilisation with increasing number of lactations can lead to more problems with metabolic health and fertility.



Development of the BCS and immune response over the course of several lactations
(according to Bradford and Contreras, 2024)

1.7 Problem area high performance – health and fertility

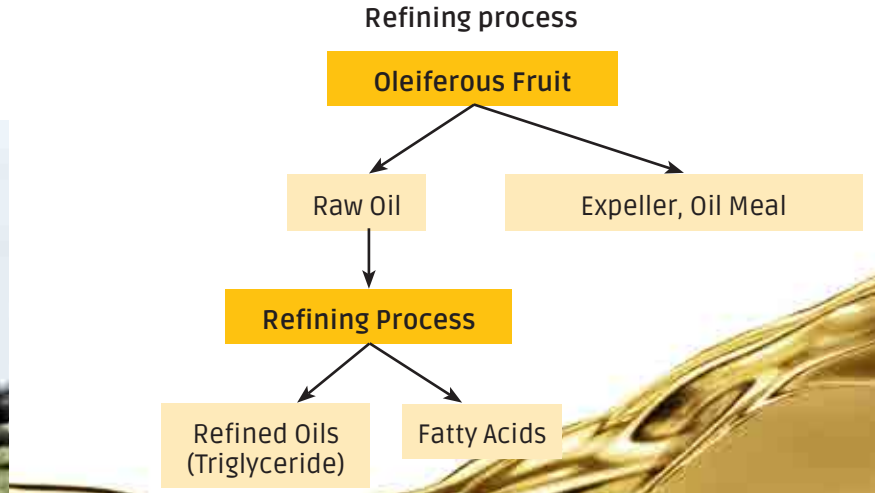


2 | Vegetable oils and their processing

2.1 Refining

Various vegetable oils are used in the production of ration for dairy cows. The raw oils, which are extracted from seeds and fruits, are cleaned in the refining process. Unwanted substances stored during growth (e.g. toxins, dioxins, pesticide residues), are removed.

In addition to the refined oils (triglyceride), by-products such as free fatty acids are also formed.

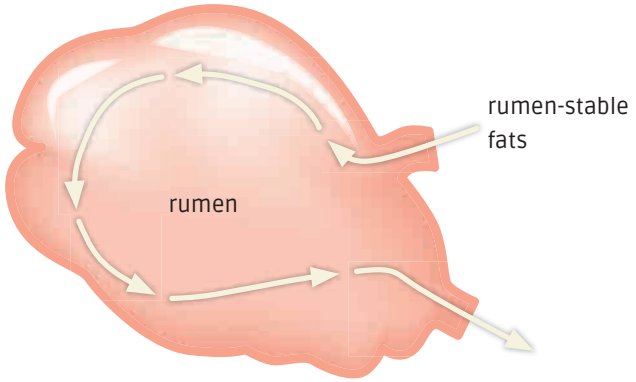


2.2 Stability of fats in the rumen

At body temperature, refined oils in the rumen are in liquid form. Due to their structure they are digestible by ruminal microbes. However, in high quantities they can disrupt the metabolism. Therefore a maximum of 600-1000 g of rumen non-stable oils per day should not be exceeded in ration for high-performance cows.

On the contrary, rumen stable fats do not impair the microbes as they are not digested in the rumen and reach the abomasum unchanged. The digestion then occurs in the small intestine.

- Stability of the rumen is reached through processing the vegetable oils resulting in the formation of rumen stable fats.



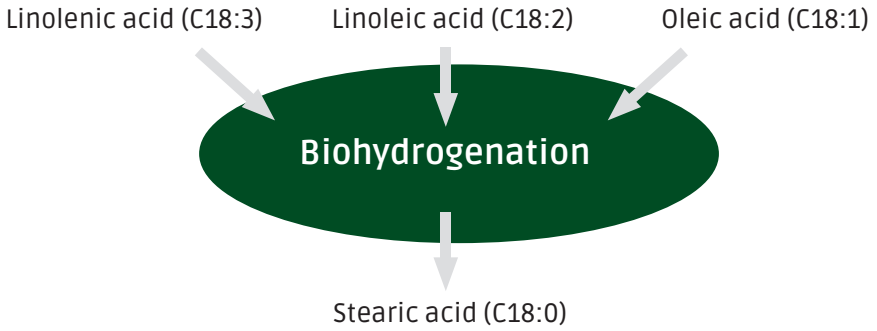
When should rumen stable fats be used?

- High milk-yield
- etosis prevention – for heavyweight cows or by low quality food
- To improve fertility
- At high outdoor temperatures because fat digestion produces less heat than carbohydrate digestion

2.3 Biohydrogenation

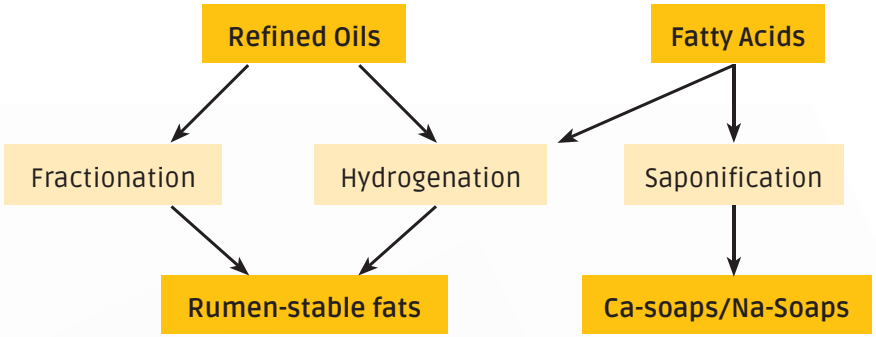
Fats from grass and corn and vegetable oils often consist of unsaturated fatty acids such as linolenic acid (C18:3), linoleic acid (C18:2) and oleic acid (C18:1). The biohydrogenation of fats in the rumen of the dairy cow is a microbial process in which unsaturated fatty acids are converted into saturated fatty acids such as stearic acid (C18:0) by microorganisms in the rumen. Biohydrogenation ensures that cows absorb mainly saturated fatty acids despite consuming unsaturated fatty acids.

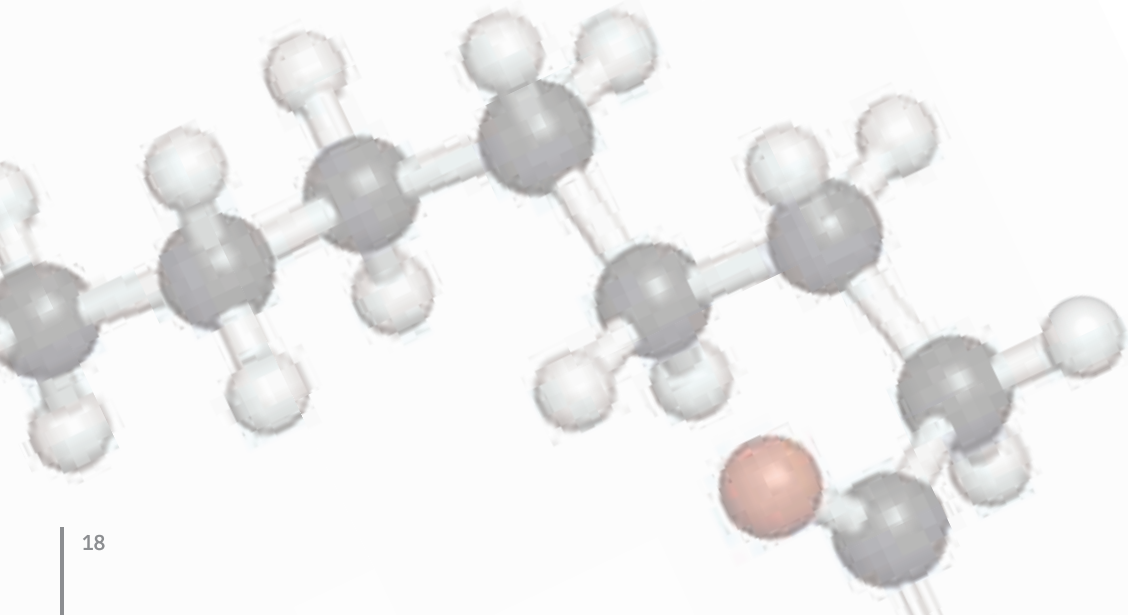
Excessive amounts of unsaturated fatty acids have a negative effect on rumen bacteria and feed intake. This can lead to reduced milk fat content and impaired rumen digestion.



Processes for the production of rumen-stable fats

Rumen-stable fats can be produced through the use of various processing methods.





2.4 Saponification

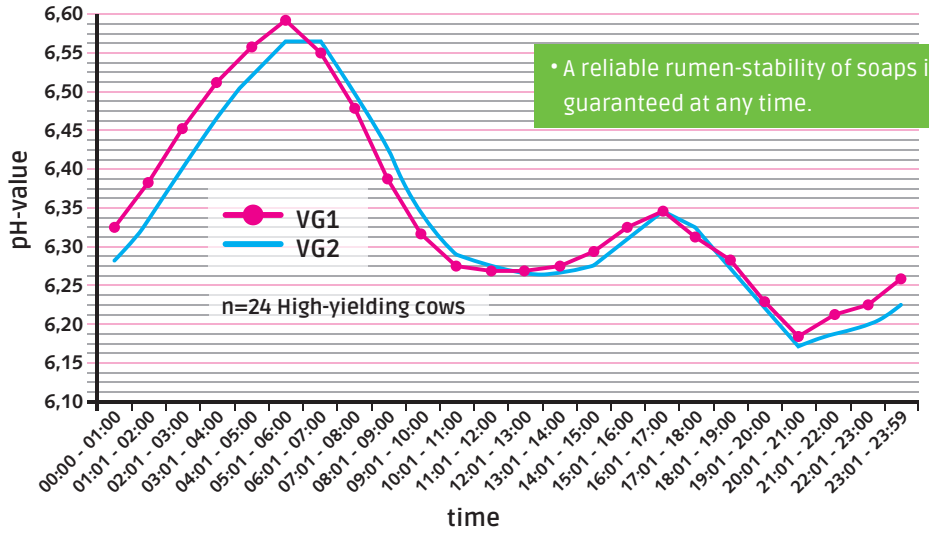
The oldest method of producing rumen-stable fats is saponification. Fatty acids produced during the refining process are mixed with calcium or sodium. During the saponification, protection from microbial attacks is generated through the esterification with calcium or sodium. This process depends on the pH-value.
A reliable rumen-stability is only possible at a pH-value of over 6.5. Under acidic conditions the soap structurally decomposes back into its smaller components, such as fatty acids and calcium or sodium. The free fatty acids are then unstable and can influence ruminal microbes.

- Adequate rumen stability for high-yield cows cannot be reached through the saponification process.

PH-value of rumen during the course of a day

According to Steingass and Zebeli (2008), an average pH-value of 6.32 in the rumen, over a 24-hour period, is necessary in order to maitain optimal physiological conditions. However, as we can see from the graph, experiments of Mahlkow-Nerge on high-yield cows (2013), the pH-value fluctuates visibly during the course of a day.

PH-value of rumen during the course of a day (Mahlkow-Nerge, 2013)



- A reliable rumen-stability of soaps is not guaranteed at any time.

2.5 Fractionation and hydrogenation

Improved processing in the production of rumen-stable fats is possible through the reduction of the proportion of unsaturated fatty acids and an increase of the proportion of saturated fatty acids (especially C 16:0 and C 18:0). Vegetable oils based on C 16:0 and C 18:0 have a typical mel-ting point of over 50 °C. This means that in solid form, under standard outside temperatures they are rumen-stable.

The reduction of the proportion of unsaturated fatty acids can be reached through two different processes:

1. Fractionation = the separation of the saturated and unsaturated fatty acids:
- Heating of liquid oils
- Controlled slow cooling leads to crystallization
- Separation of the crystallized fatty acid fractions

2. Hydrogenation = saturation of the double bonds
- Nickel acts as a catalyst when subjected to excess hydrogen
- Nickel is restored completely
- Saturation of the double bonds

A full reduction of the unsaturated fatty acids can only be achieved through hydrogenation.

Advantages of pure triglycerides:
- High quality production guaranteed – as there is no risk of undesirable byproducts
- Hydrogenated triglyceride cannot oxidize
- Highest possible stability in the rumen
- Pure triglycerides have the highest palatability

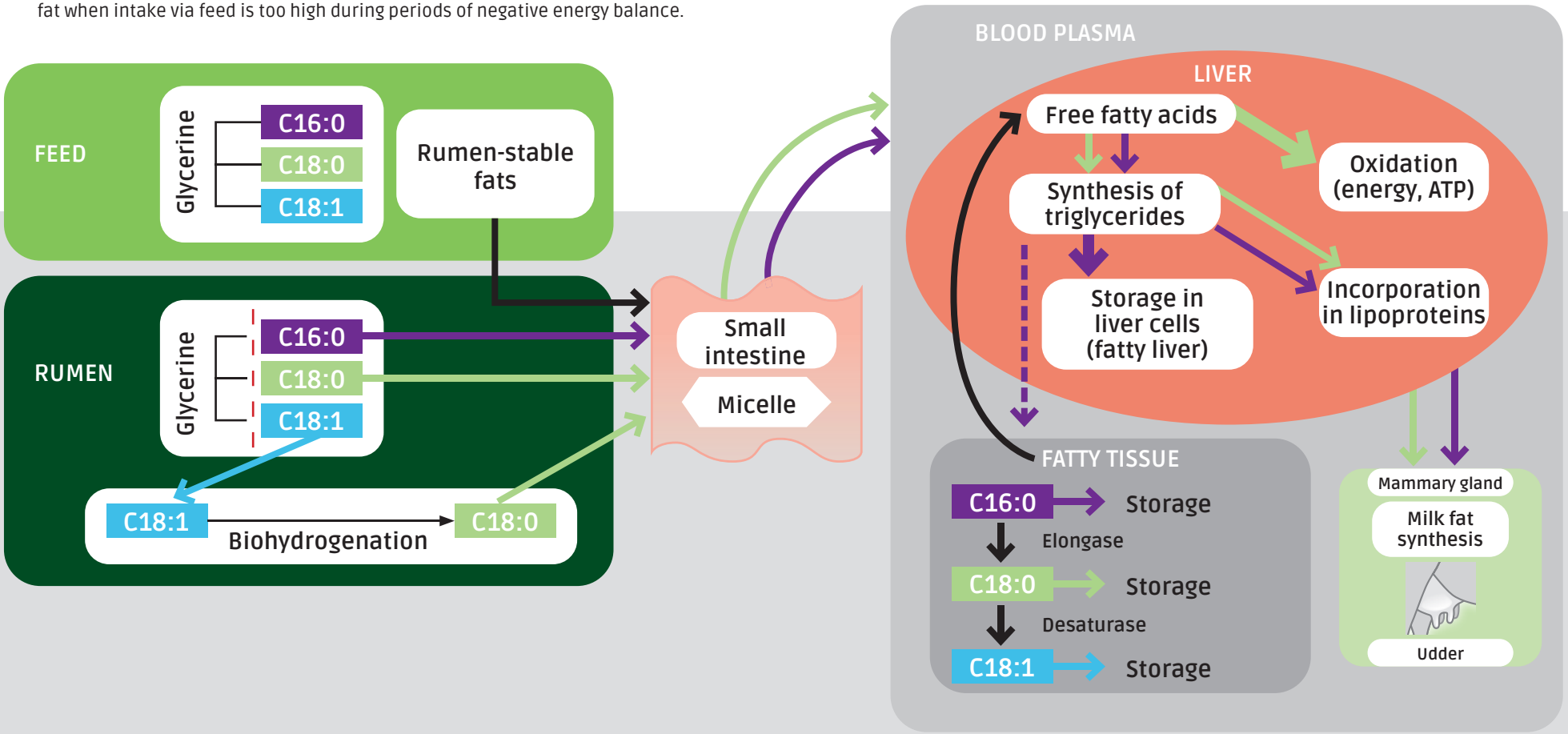
- Hydrogenated fats are processed in the production of fat powders.

It's all about the mixture: Palmitin (C16:0) and stearin (C18:0)

Due to the biohydrogenation of unsaturated fatty acids, stearic acid is the predominant fatty acid in the gut. Stearic acid is used for energy production and is not stored in the liver.

Palmitic acid is incorporated into milk fat and leads to accumulation of liver fat when intake via feed is too high during periods of negative energy balance.

Many studies on dairy cows show:
The combination of palmitic and stearic acid in rumen-stable fat has advantages for high milk yields.



3 | Solutions for dairy cow's different metabolic situations

3.1 Glucose deficit in the period close to birth

The production of milk (lactose) requires large amounts of glucose. However, most of this glucose cannot be absorbed directly from the gut.

An important function of stearic acid in the metabolism of high yielding cows at the beginning of lactation is described as a ‚glucose saving mechanism'. During periods of negative energy balance, stearic acid shifts energy towards new glucose production. In studies by Karcagi et al. (2010) and others, the drop in blood glucose levels that typically occurs at the start of lactation was significantly reduced by the use of rumen-stable fat powders containing stearic acid.

Glucose concentration in the blood of high-yielding cows

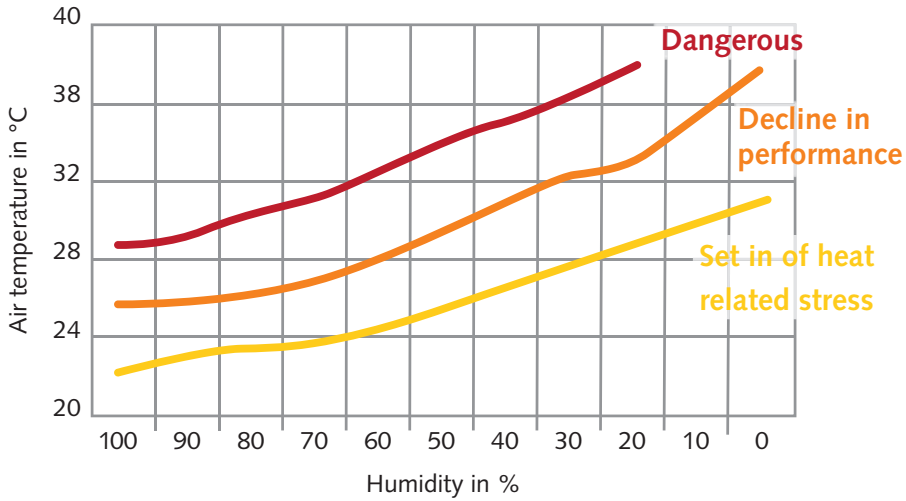
(according to Karcagi et al. 2010)

Glucose (mmol/L)	25 days before calving	5 days after calving	25 days after calving
Control (without added fat)	3.15	2.10	2.45
Palm fat (450 g triglycerides)	3.15	2.70	2.90

The cows with rumen-stable palm fat (triglyceride) showed a significantly lower drop in glucose levels, which also recovered much faster.

3.2 Energy deficit at high outside temperatures

The digestion of carbohydrates generates heat. At outside temperatures above 22 °C, the dairy cow's feed intake drops sharply to prevent further effects.



Consequences of high temperatures:

- Reduction of energy because of low feed intake
- Increased risk of acidosis
- Decreased milk yield
- Decreased fertility

- Cows can be impaired at a temperature of 20 °C!

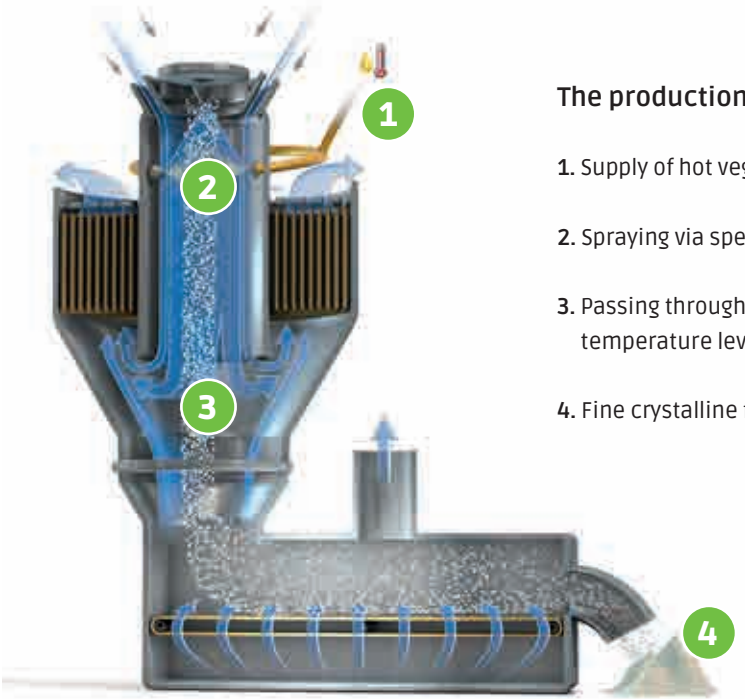
4 | Production processes and product lines of fat powders

4.1 Production processes of rumen-stable fat powders

Rumen-stable fats, with high melting points, are only digestible for cows when in powder form.

Through our special spray-cooling process procedure (see diagram), we produce a very fine, pourable powder which is highly digestible and also optimal for further use.

Spray-cooling process procedure of fats



The production:

1. Supply of hot vegetable oil

2. Spraying via special nozzle

3. Passing through different temperature levels

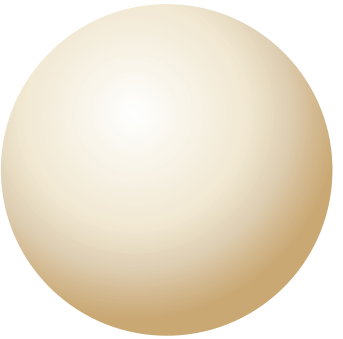
4. Fine crystalline fat powder

Advantages of BEWITAL fat powders

The ease of digestion of these fat powders depends highly on the size and surface of their particles. A reduction in particle size leads to an increase of surface in relation to mass. A surface increase thus leads automatically to an increase of area that can be utilized by lipase bacteria in the digestive tract. This increases digestibility.

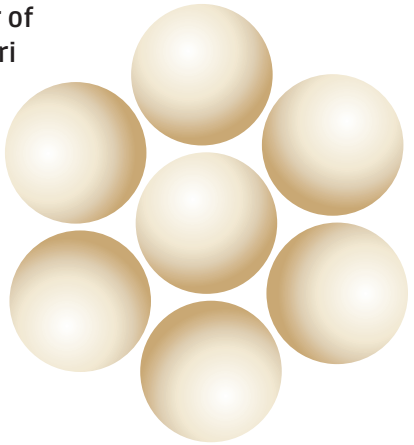
Conventional fat powder

- Small surface = small attack surface for enzymes = low digestibility



Fat powder of BEWITAL agri

- Large surface = large attack surface for enzymes = high digestibility



4.2 Our product lines

BEWI-SPRAY®
fat powders

Energy concentrates/ fat powder

BEWI-SPRAY® offers a wide range of energy concentrates.

From rumen-stable fats for dairy cows and lecithin-enriched energy concentrates for pigs to specialised products for poultry and fish. Our unique manufacturing process produces fine crystalline fat powders that are highly digestible and provide maximum energy to animals.

BEWI-LACTO+®
incorporated farm solutions

Special energy combinations

BEWI-LACTO+® represents high-quality combination products made from pure fat powders and metabolically active ingredients such as amino acids, vitamins, urea and dextrose.

These products are designed for direct use on dairy farms and provide targeted support for cows in phases of increased demand. For example, to support the metabolism in early lactation.

BEWI-FATRIX®
incorporated ingredients

Special spray cooling concentrates

The **BEWI-FATRIX®** product line includes speciality concentrates that can be used as components in premix, mineral or compound feed.

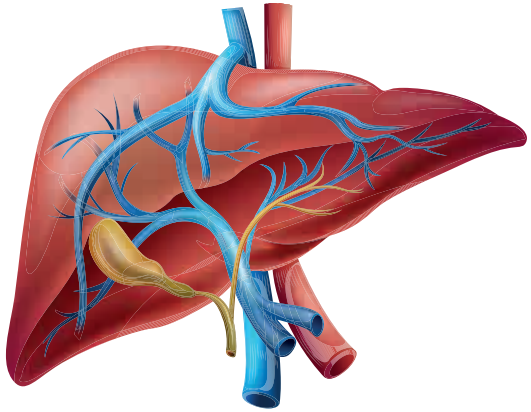
For example, amino acids, vitamins or other ingredients are used as active substances, which are combined in a fat matrix. This ensures that the active components are optimally embedded. This guarantees easy handling and optimum mixability.

Milk yield and liver health

80% of diseases in dairy cows are caused by metabolic disorders. The liver is the central organ. Much of the digested feed is metabolised in the liver and made available for milk production in the udder.

Up to 4 kg of new glucose is produced in the liver every day.

At very high milk yields and with increased fat mobilisation in early lactation, the liver requires large amounts of methyl group donors (including from choline) for fat conversion.



Natural (rapeseed) lecithin can support the transformation of fats at high milk yields through its function as an emulsifier.

BEWI-SPRAY® 99 L

Rumen-stable fat powder based on palm oil with rapeseed lecithin

- ✓ Allows for high energy supply without disturbing ruminal functions
- ✓ Finely sprayed - therefore highest digestibility in the small intestine
- ✓ Free from taste and smell
- ✓ Supports milk fat content and high milk yields
- ✓ Balanced ratio of palmitic and stearic acid
- ✓ With natural rapeseed lecithin

Application:
Feed 200-500 g per cow per day as supplementary feed.

Packaging:

25 kg bag

BEWI-SPRAY® 99 M

Rumen-stable fat powder based on palm oil

- ✓ Allows for high energy supply without disturbing ruminal functions
- ✓ Finely sprayed - therefore highest digestibility in the small intestine
- ✓ Free from taste and smell
- ✓ Supports milk fat content and high milk yields
- ✓ Balanced ratio of palmitic and stearic acid

Application:
Feed 200-500 g per cow per day as supplementary feed.

Packaging:
25 kg bag

BEWI-SPRAY® RS 70

Rumen-stable fat powder based on rapeseed oil

- ✓ Processed from European raw materials (rapeseed oil)
- ✓ Fulfills quality standards of different creameries (e.g. Landliebe, Goldsteig)
- ✓ Allows for high energy supply without disturbing ruminal functions
- ✓ Finely sprayed - therefore highest digestibility in the small intestine
- ✓ Free from taste and smell
- ✓ Supports high milk yields
- ✓ High stearic acid content, promotes energy metabolism

Application:
Feed 200-500 g per cow per day as supplementary feed.

Packaging:
25 kg bag

BEWI-SPRAY® FA

Rumen-stable fat powder made from distilled and hydrogenated palm fatty acids

- ✓ Rumen-stable due to high melting point of 54°C
- ✓ Finely sprayed - therefore highest digestibility in the small intestine
- ✓ Typical taste and smell
- ✓ Higher rumen stability and better acceptance compared to Ca-soaps
- ✓ Balanced ratio of palmitic and stearic acid

Application:
Feed 200-500 g per cow per day as supplementary feed.

Packaging:
25 kg bag

BEWI-SPRAY® C 16

Rumen-stable fat powder from fractionated palm fatty acids

- ✓ Rumen-stable due to high melting point of 54°C
- ✓ Finely sprayed - therefore highest digestibility in the small intestine
- ✓ Free from taste and smell
- ✓ Higher rumen stability and better acceptance compared to Ca-soaps
- ✓ > 80 % palmitic acid; promotes the milk fat content

Application:
Feed 200-500 g per cow per day as supplementary feed.

Packaging:
25 kg bag

Sugar provides quick energy

Especially with rations rich in grass silage, a low residual sugar content in the silage can limit rumen fermentation.

The addition of sugar to the ration of post-parturition cows helps generate the energy required. The concern that high sugar content could cause rumen acidosis is unfounded. This has been proven by Canadian studies using targeted addition of readily available sugars.

- The intake of dry ration increased with addition of sugar (+ 1.1 kg DM/day)
- The pH-value in the rumen tended to be higher with additional sugar (not less)
- With addition of sugar, milk fat production increased (+ 1.44 kg compared to 1.35 kg/day)

The addition of sugar increases the intake of ration and improves the rumen fermentation, while also helping to optimize the supply of energy. .

BEWI-LACTO+® Sweet

Rumen-protected fat with dextrose

- ✓ Combination of rumen-stable fat and readily available sugar (dextrose)
- ✓ Rumen-stable fat has a direct effect on the cow's metabolism
- ✓ Dextrose improves the palatability and promotes increased feed intake
- ✓ Improves the supply of energy to the cow and the ruminal bacteria
- ✓ Also applicable in calf rearing and fattening in order to exploit growth potential
- ✓ Energy content: 21.4 MJ NEL/kg or 31 MJ ME/kg

Application:
Feed 200-500 g per cow and day or 100-150 g per calf and day as supplementary feed.

Packaging:

25 kg bag

Efficiency

During the last decades, methionine has shown to be the first limiting amino acid in dairy production, especially in corn-based rations (Schuba and Südekum, 2012). Furthermore, the amino acid has an effect in the metabolism of the cow. However, increasing inclusion of rapeseed meal and/or several by-products as e.g., brewer´s grains, grain distillers or corn gluten feed, lysine is getting more and more into the focus.

In a study with 130 HF cows, it was therefore assessed whether a supplementation of methionine and lysine has an effect on milk yield or milk ingredients on dairy farms in practice when using rapeseed extraction meal and by-products.

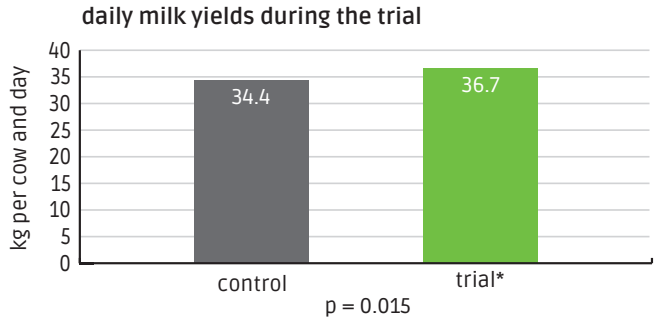
Material and methods

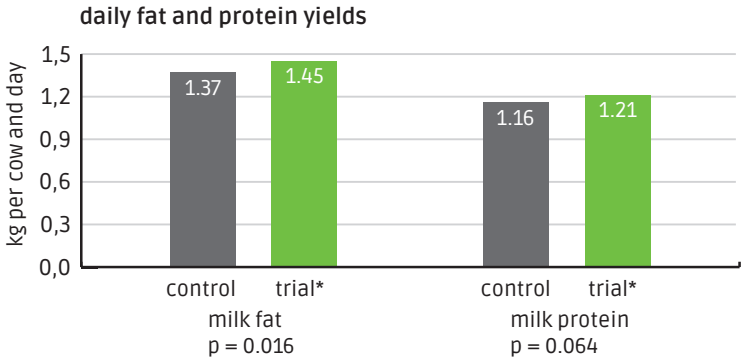
- After first milk control (week 0), the cows were paired according to their calving date (+/- 1 day) and observed between day 15 and 280 in milk, for the following seven milk controls (week 5 until 32).
- The trial group received a concentrate feed added with 2,5% of a combination product out of methionine and lysine (**BEWI-FATRIX**® LM 101) (see table).
- Hence, the cows of the trial group received approx. 14 g absorbable methionine and 14 g absorbable lysine/cow/day.

Component (%)	Control group	Trial group
corn (dried)	25.6	25.0
Rapeseed meal	23.8	23.2
Distiller´s grains and solubles (DDGS)	13.3	13.0
Corn gluten feed	10.3	10.0
Palm expeller	12.3	12.0
Bran	7.2	7.0
Minerals/vitamins etc.	4.2	4.1
BEWI-FATRIX® LM 101	–	2.5
Calculated content:		
Crude protein	198 g/kg	200 g/kg
NEL	6.9 MJ/kg	7.2 MJ/kg

Composition and contents of the concentrates

Results





*with the addition of methionine and lysine (**BEWI-FATRIX**® LM 101)

Conclusion

- The addition of methionine and lysine led to a significant increase in milk performance of 2.3 kg while milk fat synthesis was increased by 80 g/day; milk protein synthesis was tendentially increased
- The effects of additional amino acids (methionine + lysine) in this trial confirm the importance of amino acid supply in dairy cow rations with increased proportions of by-products

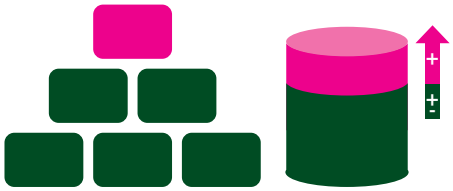
Ensure a good supply of amino acids without damaging the environment

If farmers try to increase the amount of UDP by using various protected feed components (rapeseed meal, soya) and so increase the amount of methionine and lysine, this also leads to a rise in other amino acids. Surplus amino acids must be removed from the metabolism, which is a complex process.

This leads to undesirable high urea levels in the milk. Removing the surplus nitrogen in the form of urea puts a strain on the liver and kidneys, and takes up energy which is then missing from other parts of the dairy cow's metabolism. Higher levels of protein carriers increase the secretion of both nitrogen and phosphorus.

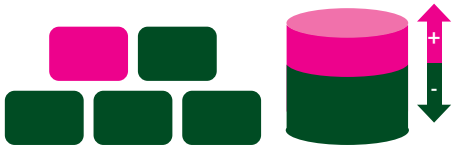
In contrast, amino acids can be added to feed rations in a targeted way. The way in which methionine and lysine are incorporated into a feed ration depends on its make-up. In rations with high crude protein levels, part of the protein carrier content can be withheld if methionine and lysine are added, which reduces the crude protein content of the ration. In rations with a low crude protein content, or rations with a less than ideal amino acid ratio, on-top application of methionine and lysine allows better use of the ration potential and improves nitrogen efficiency.

On-top application



- To ensure better use of the feed ration potential

Reduction of the crude protein content



- To ensure adequate lysine and methionine supplies

BEWI-LACTO+® Amino LM

Rumen-protected fat with lecithin and embedded methionine & lysine

- ✓ Supports optimum amino acid supply with lower protein carrier levels
- ✓ Methionine ensures that first limiting amino acids are available to dairy cows
- ✓ Lysine provides cows with the amino acid they need for milk production
- ✓ Rumen-protected fat significantly improves the energy situation without impeding rumen function
- ✓ Rapeseed lecithin provides natural choline to support fat metabolisation in the liver
- ✓ Supports the metabolism of cows and so improves fertility
- ✓ The combination of fat and lecithin optimally compensates for the cow's energy deficits
- ✓ Energy content: 21,4 MJ NEL/kg | methionine: 40 g/kg | lysine: 40 g/kg

Application:
BEWI-LACTO+® Amino LM
should be given to cows at dose of 300 to 500 g per cow per day..

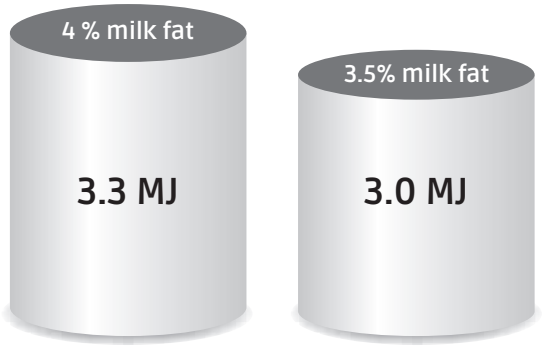
Packaging:

25 kg bag

Fertility

Dairy cows often have problems with impaired fertility and shorter useful lives. These problems are not due to high milk yields but to an inadequate energy supply.

The energy required for milk production depends mainly on the fat content of the milk. The more milk fat needs to be formed, the more energy the dairy cow needs. This means that this energy is no longer available for other metabolic processes.



Consequences of energy deficit for fertility:

- Weak oestrus symptoms
- Weakened ovaries
- Slower ovary regeneration
- Early embryonic death
- Longer interval between calving
- Early culling

Challenges:

- Improving the energy balance at the start of lactation
- Maintaining health and fertility at high milk yields

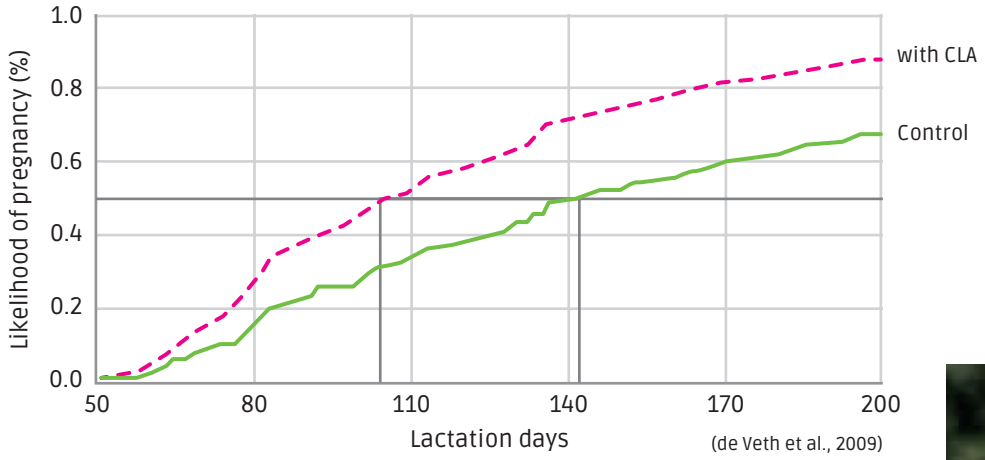
Our solution: **BEWI-FATRIX® CLA**

- Conjugated linoleic acids (CLA) reduce the synthesis of new milk fat in the udder.
- The lower fat content means that less energy is required per kg of milk.
- The energy that becomes available can be used for other important processes, such as milk formation, fertility and metabolic processes..

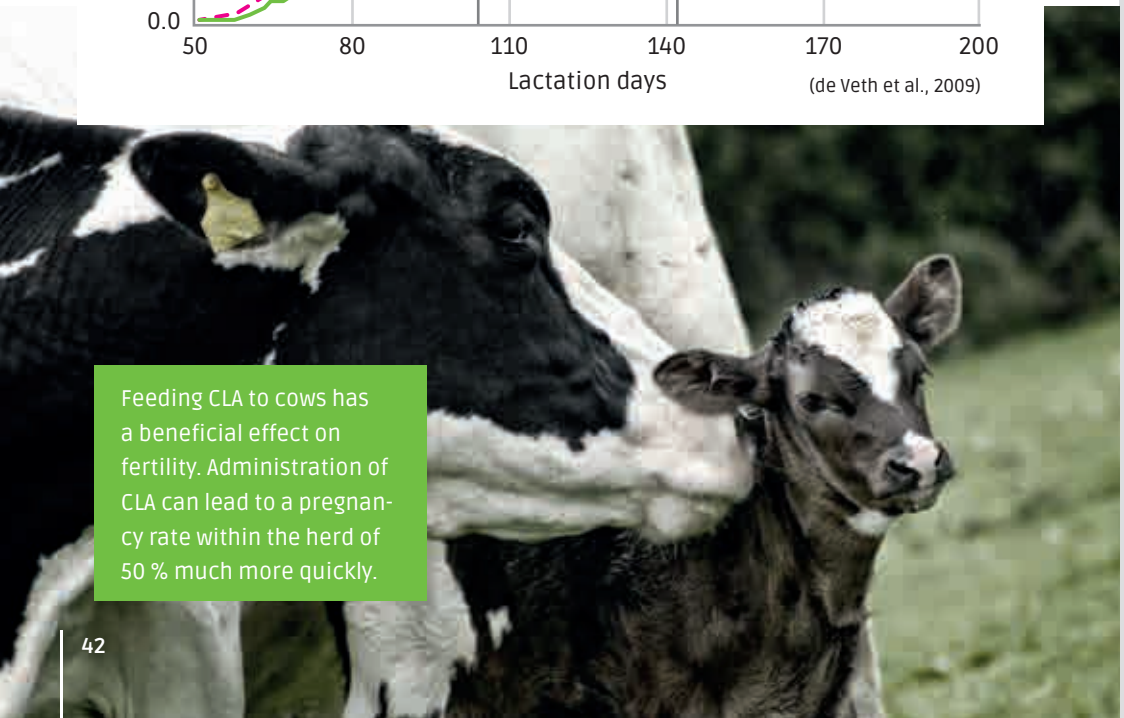
CLA has a positive effect on fertility

Assessments of comprehensive studies from America, the United Kingdom and the Netherlands clearly confirm the positive effect of CLA on fertility.

Connection between CLA and the likelihood of pregnancy.



(de Veth et al., 2009)



Feeding CLA to cows has a beneficial effect on fertility. Administration of CLA can lead to a pregnancy rate within the herd of 50 % much more quickly.

BEWI-FATRIX® CLA

Energy-additive package for high yielding cows

Rumen-protected fat with conjugated linoleic acid

- ✓ The combination of rumen-protected fat and conjugated linoleic acid (CLA) optimises the energy balance of dairy cows
- ✓ Rumen-stable fat increases the energy concentration of the feed ration without affecting rumen function
- ✓ Conjugated linoleic acid reduces the energy requirement per kilogram of milk
- ✓ Increases the milk yield
- ✓ Improves fertility
- ✓ Energy content: 24.5 MJ NEL/kg

Application:
Add 200 g **BEWI-FATRIX®** CLA per cow and day to the feed for a period of 14 days before birth (a.p.) to 30 days after birth (p.p.) or 100 g per cow and day for a period of 14 days a.p. to 80 days p.p. Can be used as a component in the milk performance feed or in the supplementary feed.

Packaging:

25 kg bag

Special challenge of high milk yield

A high performance level and a stable lactation curve are essential for an efficient milk production.

Breeding progress in dairy cows has led to a continuous increase in the genetic potential for milk production. In agricultural practice, this is often accompanied by the occurrence of metabolic symptoms and other stresses during peak lactation.

The negative energy balance that occurs during the first third of lactation leads to the mobilisation of body fat. This produces metabolic products that need to be metabolized in the liver.

Natural choline and antioxidants can support metabolism and the liver and stabilise milk production.

BEWI-FATRIX® CX

Supplementary feed for dairy cows for holistic metabolic support

- ✓ Allows for high energy supply without disturbing ruminal functions
- ✓ With rapeseed lecithin as an emulsifier
- ✓ Vitamin E and vitamin C with an antioxidant effect on the metabolism
- ✓ Contains willow bark with all its natural components
- ✓ Supports performance and efficiency

Application:
Use 100 g **BEWI-FATRIX®** CX per cow and day in the first third of lactation or if there is an increased requirement.

Packaging:

25 kg bag

Correct use of acid salts in dry cattle feeding

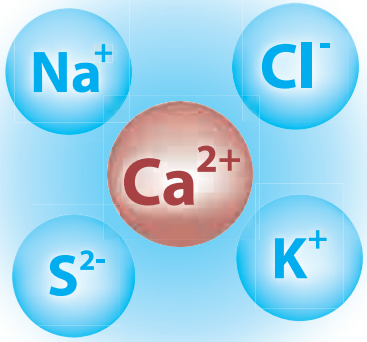
In recent years, many dairy farmers have already been intensively involved with the DCAB concept (DCAB: dietary-cation-anion-balance) in dry period feeding. It is known that a low DCAB in the dry period can help prevent milk fever.

The effect or success in dairy cows is often measured by urine pH or its reduction. However, pH is a very slow responder to dietary DCAB adjustment. The true effect of the ration on acid-base balance can be better assessed by using urinary net acid-base excretion (NABE).

A short-term metabolic acidosis in the blood activates mechanisms for calcium release from the skeleton. Due to the metabolically induced, higher calcium excretion via the kidneys, an adapted, higher calcium supply is important at the same time. However, precise knowledge of the DCAB values of the ration and a good assessment of the ration and the feed intake of the cows are crucial here.

The use of acid salts should be accompanied by feeding advice and attention should be paid to an adequate calcium supply (and calcium supplementation).

DCAB (meq/kg T) = (42.5 * g Na + 25.6 * g K) - (28.2 * g Cl + 62.3 * g S)



BEWI-FATRIX® Anionic

Rumen-stable fat with ammonium chloride; to acidify the urine

Dietary supplement feed for dairy cows

- ✓ To reduce the risk of milk fever and subclinical hypocalcaemia
- ✓ To reduce the risk of urinary stone formation
- ✓ Contains ammonium chloride to reduce the DCAB
- ✓ Optimum palatability thanks to the unique production technology
- ✓ Enables high feed intake during the dry period

NEW

Application:
BEWI-FATRIX® Anionic with max. 20 g per kg dry matter feed. Only use after DCAB calculation, taking the calcium supply into account.

DCAB: -10,175 meq/kg

0.2 % calcium

Packaging:

25 kg bag

5 | ANNEX

Dairy cow's requirements of ration during first third of lactation

Total mixed ration (TMR)	
• MJ NEL	> 7.0
• Starch + sugar	240-280 g/kg TM
• Derived from sugar	60 g/kg TM
• Rumen-stable starch	50-65 g/kg ZM
• crude fibre	> 160 g/kg TM
• structure value	1.2

Comparison of Ca-soaps, fractionated fats and hydrogenated fats

	Ca-Soap	Fractionated triglyceride	Hydrogenated fatty acids **BEWI-SPRAY®** 99 FA	Hydrogenated triglyceride **BEWI-SPRAY®** 99 M	Fractionated fatty acids **BEWI-SPRAY®** C 16
Fat content	84.0 %	99.0 %	99.5 %	99.5 %	99.5 %
Crude ash	12.5 %	0.0 %	0.0 %	0.0 %	0.0 %
Calcium	9.0 %	0.0 %	0.0 %	0.0 %	0.0 %
FFA		max. 10 %	min. 85 %	< 2 %	min. 70 %
MJ NEL/kg	approx. 20.5	approx. 25	approx. 25	approx. 25	approx. 25
Smell	- -	ø	ø	+	+
Palatability	- -	ø	ø	+	+
Acceptance	- -	ø	–	+	+
Structure	very coarse	coarse	fine	fine	fine
Rumen stability	- -	+	+	+	+
Digestibility	ø	ø	++	++	++

Fatty acid composition and melting points of important vegetable oils

Vegetable oils differ in their individual fatty acid composition (i.e. the proportion of unsaturated fatty acids), and therefore also differ in their respective melting points.

Fettsäuremuster (laut Literatur)	Linseed oil	Coconut oil	Palm oil	Rapeseed oil	Palm oil hydrogenated	Palm oil fractionated	Rapeseed oil hydrogenated
C 12:0 and shorter	-	61 %	-	-	-	-	-
C 14:0 (Myristic acid)	-	18 %	1 %	-	1 %	1 %	-
C 16:0 (Palmitic acid)	6.5 %	9 %	44 %	4 %	44 %	86 %	4 %
C 18:0 (Stearic acid)	3.5 %	2.5 %	5 %	1.5 %	54 %	3 %	93.5 %
C 18:1 (Oleic acid)	18 %	7 %	39 %	63 %	-	7 %	-
C 18:2 (Linoleic acid)	14 %	2.5 %	10 %	20 %	-	1 %	-
C 18:3 (α-linoleic acid)	58 %	-	-	9 %	-	-	-
Melting point	- 18 to -25 °C	18 to 20 °C	30 to 37 °C	0 °C	58 °C	54 °C	70 °C

The concentration of unsaturated fatty acids in oils has various advantages as well as disadvantages:

+ Support important functions of the cow´s metabolism
- They are sensitive to long term storage, sunlight and oxygen production

Notes:

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specialist in milk & fat

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