Solutions for successful rearing from BEWITAL agri.
Age-appropriate feeding programmes covering animals’ energy and nutrient requirements and preventing disease (especially diarrhoea) are very important aspects of piglet rearing. Only in this way can farms meet the demand for uniform, well-grown and healthy animals that can be reared and fattened successfully and without problems.

The most important critical phases with regard to animal health are animal exchange, switching pens and switching feed. When animals are being moved from one pen to another they often come into contact with new neighbours and a different spectrum of germs. The pressure of infection caused by new germs presents the immune system with a challenge. Optimum living conditions can reduce the risk of disease, as can adapted feeding. The key element here is the need to support the digestive system, which is the body’s largest immune organ.

In addition, deficiencies and extreme surpluses must always be avoided in the rearing phase. This can also be achieved by optimum selection of feed components and the use of feed additives. “Targeted feeding makes a decisive contribution to guaranteeing successful piglet rearing. What is missed at piglet stage cannot be recovered later on during fattening”, stresses Dr. Michael Hovenjürgen, in charge of research and development at BEWITAL agri.
1. Principles
1.1 Colostrum supply ................................................................. 6
1.2 Water quality ........................................................................ 7
1.3 Digestive enzymes .............................................................. 8

2. Main nutrients
2.1 Proteins ................................................................................ 9
2.2 Carbohydrates .................................................................... 10-11
2.3 Fats .................................................................................... 12-15

3. BEWITAL solutions to piglet-rearing problems
3.1 Early-stage piglet diarrhoea ................................................ 16-17
3.2 Litter size, milk deficit ......................................................... 18-19
3.3 Rearing orphan piglets/fostering ........................................ 20-21
3.4 Piglet losses due to streptococci ......................................... 22-25

4. Our BEWI-PIG® whey-fat concentrates
4.1 Benefits of whey-fat concentrates ........................................ 26
4.2 How fat concentrates are produced ..................................... 27
4.3 Our BEWI-PIG whey-fat concentrates ................................. 28-29

5. Tailor-made solutions are our strong point .............................. 30

6. Appendix
Feed recommendations ........................................................... 31
1.1 Colostrum supply

Unborn piglets do not receive any immunity to germs via the sow’s placenta. Once they are born, their immunity depends entirely on the supply of colostrum. The level of immunoglobulins in colostrum falls sharply in the first few hours after birth, as does the permeability of the piglet’s intestinal wall.

The antibody content of sows' milk falls rapidly after the first piglet is born

The following principles apply to colostrum supply:
• Piglets must be placed at the teat as soon as possible in order to ensure good intake.
• Immunoglobulins must be pen-specific/herd-specific in order to achieve the desired result in the piglet.
• Piglets born at the end of the litter must also be able to ingest enough colostrum.

1.2 Water quality

Piglets must also have unrestricted access to drinking water while suckling, right from the first few days of life.

The following aspects must be borne in mind:
• The water temperature must be at least 8 °C in order to avoid harming the animal
• Make sure that contaminants are kept out of the pen water supply system (flush systems through before placing them in the pens)
• Prevent the formation of a biofilm
• Prevent germs reproducing in and on the drinking-water systems
• Make sure that drinking water is free from salmonellae, campylobacter and E.coli
• Test water quality regularly, including from the drinking nipple (take samples)
1.3 Digestive enzymes

During digestion, nutrients in feed are broken down into absorbable units. Enzymes are involved in this food breakdown. Enzyme activity in the digestive tract plays an important part in making nutrients available for use and helping the animal tolerate them.

After birth, the piglet’s enzyme activity is initially focussed on milk as a source of nutrients. Milk is an energy provider, containing mainly lactose and fat. As piglets get older, the activity of enzymes which break down starch, fat and protein increases. This is why so much care is needed in feeding young piglets.

2.1 Proteins

The activity of enzymes which break down proteins is still low in the first few weeks of life. This means that easily digestible proteins are needed. To help piglets through weaning it is important for their feed to contain an appropriate amount of dairy products (skimmed milk powder, whey powder).

Dairy products are easy to digest, tasty and contain easily digestible proteins and milk sugar (lactose). As piglets were previously fed mainly on sows’ milk, they can efficiently use components of the dairy products to obtain energy and digest other nutrients.

A piglet weighing 10 to 20 kg consumes three times as much feed per kg body weight than a pig weighing 120 kg. It is therefore important to offer piglets large numbers of small portions of feed. Regular arrival of feed in the intestines increases the amount of enzymes secreted. This improves absorption.
2.2 Carbohydrates

Carbohydrates are an important source of energy in piglet feed. Lactose is a source of carbohydrate found only in milk, and provides young animals with energy. It is a disaccharide made up of galactose and glucose. Piglets have a good ability to metabolise lactose (via lactase) and valuable animal fats (via lipase), and in the early stages start slowly to secrete enzymes that make other carbohydrates digestible.

Lactose is also responsible for balanced intestinal flora and stimulates feed consumption. This means that lactose is an important component in high-quality piglet feed.

When piglets are weaned, their digestive system must change to cope with feed with a high plant-based starch and protein content. The secretion of enzymes that break down carbohydrates (amylase) takes quite a long time to establish. But the production of these enzymes can be stimulated by adding pre-starters to feed at an early stage.

The requirements of components used in piglet feed are very high. Crushed cereal, for example, is always contained in piglet feed. An intensive crushing process breaks down the compact starch structure in the cereal grains, making the starch easier to digest. Crushing also reduces the amount of undigested starch reaching the latter part of the small intestine, effectively preventing diarrhoea.
Fats play an important role in animal nutrition. They act as a source of energy, storage medium, help construct membranes, and are involved in absorption, synthesis and transport of hormones and vitamins.

Fat is the energy source with the highest energy density in feed for young animals. Sows' milk contains around 20% fat in dry mass. This shows that piglets can easily digest fat.

However, some points need to be borne in mind for optimum digestion:
- Fatty acid profile
- Ratio of Omega 3 and Omega 6 fatty acids
- Freshness of fats / resistance to oxidation

### 2.3 Fats

The fatty acid profile in BEWI-PIG® products is based on the fatty acid profile of sows' milk, and has a high proportion of short- and medium-chain fatty acids. These are particularly easy to digest.

#### Fatty acid profile

Fats normally consist of three fatty acids esterified to a glycerine molecule. These fatty acids differ in their chain lengths and in the number of unsaturated double bonds.

<table>
<thead>
<tr>
<th>Fatty acid profile</th>
<th>Milk fat (sow)</th>
<th>Coconut oil</th>
<th>Palm oil</th>
<th>Soya oil</th>
<th>Rape-seed oil</th>
</tr>
</thead>
<tbody>
<tr>
<td>C 12:0 and shorter</td>
<td>-</td>
<td>61%</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>C 14:0 (myristic acid)</td>
<td>3.5%</td>
<td>18%</td>
<td>1%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>C 16:0 (palmitic acid)</td>
<td>26%</td>
<td>9%</td>
<td>44%</td>
<td>10%</td>
<td>4%</td>
</tr>
<tr>
<td>C 18:0 (stearic acid)</td>
<td>4%</td>
<td>2.5%</td>
<td>5%</td>
<td>4%</td>
<td>1.5%</td>
</tr>
<tr>
<td>C 18:1 (oleic acid)</td>
<td>51%</td>
<td>7%</td>
<td>39%</td>
<td>23%</td>
<td>63%</td>
</tr>
<tr>
<td>C 18:2 (linoleic acid)</td>
<td>7%</td>
<td>2.5%</td>
<td>10%</td>
<td>60%</td>
<td>20%</td>
</tr>
<tr>
<td>C 18:3 (alpha-linoleic acid)</td>
<td>1%</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>9%</td>
</tr>
</tbody>
</table>
Ratio of Omega 3 and Omega 6 fatty acids:

Omega 3 and Omega 6 belong to the group of essential fatty acids and cannot be produced by pigs themselves. They must therefore be added to feed. Both of them play a different role in inflammatory processes.

Excessively high levels of Omega 6 fatty acids encourage inflammatory reaction. In practice, soya oil is often used as a source of fat. This contains a high proportion of Omega 6 fatty acids (linoleic acid). This results in an unfavourable ratio of Omega 3 to 6 fatty acids (proportion of Omega 6 fatty acids too high). The use of BEWI-PIG® products has a beneficial impact on this ratio.

Freshness of fats / resistance to oxidation:

Fats remain usable for varying lengths of times because they have different properties. Quality is affected by levels of:
- oxygen
- water
- unsaturated fatty acids

The key factors in quality are:

a) Peroxide value = The peroxide value (POV) is used to measure the amount of oxygen bound to a fat or oil as peroxide, and is a quality characteristic indicating the freshness or age of the fat or oil. The lower the figure, the fresher the oil or fat.

b) Free fatty acids (FFA) level = the level of free fatty acids is an important quality characteristic. The lower this figure is, the better the oil or fat will store and so the longer it will remain usable.

The consequences of fat spoiling are:
- Rancid odour
- Rancid taste
3.1 Early-stage piglet diarrhoea

The immune system of piglets is very slow to develop, which means that suckling piglets in the critical first four weeks of life are particularly vulnerable to diarrhoea conditions.

Diarrhoea conditions are a major problem despite improvements in piglet management. This has financial consequences, and piglets which fail to grow well in the early stages cannot make this up when they reach fattening age. Diarrhoea is an intestinal condition that manifests mainly as watery stools, dehydration and weight loss. It can also be fatal in particularly severe cases.

Diarrhoea can be triggered by infectious and non-infectious causes:
- **Infectious causes:** e.g. viruses/bacteria
- **Non-infectious causes:** e.g. inappropriate nutrient composition, excessive feed intake

Uses:
Dissolve 50 g of BEWI-SAN Piglet-Cola per litre of water (temperature around 30 °C).
Offer unlimited amounts until the piglets are five days old. Then switch to piglet milk or pre-starter.
Specially developed to provide suckling piglets in the first few days of life with an additional source of rapid energy, valuable electrolytes, intestinal flora stabilisers and more fluid.

**BEWI-SAN Piglet Cola**

Dietary supplement to stabilise the physiological digestive of suckling piglets

- Tasty electrolyte drink for suckling piglets
- A learning process for early consumption of supplementary feedstuffs offered in addition to sows’ milk (e.g. piglet milk, pre-starter)
- Easily digestible, rapidly available energy for more active piglets
- With intestinal flora stabilisers
- Ensures that animals receive enough electrolytes, stabilises physiological digestion
- Ideal supplement for additional fluid intake by piglets

**Infectious causes:** e.g. viruses/bacteria

**Non-infectious causes:** e.g. inappropriate nutrient composition, excessive feed intake
3.2 Litter size/milk deficit

Advances in breeding have led to a rise in the number of piglets being born. An improvement in sow breeding performance and the number of piglets sold has a considerable impact on the profitability of piglet production. However, breeding success is associated with some drawbacks:

- Fall in average birth weight and the chance of piglet survival
- Greater weight differences within a litter
- Weaker piglets are unable to compete with their siblings for the front teats which produce more milk. This often results in total losses
- Nutrient deficiency due to an inadequate supply of sows’ milk
- Once the piglets are weaned, the sow is in poor condition due to the intensity of the feeding process and so is less likely to conceive

Litter size rises faster than milk production

Live piglets per litter | Milk production per sow (litres/day)
---|---
14 | 13,5
13 | 12,5
12 | 11,5
11 | 10,5
10 | 9,5

<table>
<thead>
<tr>
<th>Year</th>
<th>Milk deficit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>9,5</td>
</tr>
<tr>
<td>2000</td>
<td>10,5</td>
</tr>
<tr>
<td>2002</td>
<td>11,5</td>
</tr>
<tr>
<td>2004</td>
<td>12,5</td>
</tr>
<tr>
<td>2006</td>
<td>13,5</td>
</tr>
<tr>
<td>2008</td>
<td>14,5</td>
</tr>
<tr>
<td>2010</td>
<td>15,5</td>
</tr>
<tr>
<td>2012</td>
<td>16,5</td>
</tr>
<tr>
<td>2014</td>
<td>17,5</td>
</tr>
<tr>
<td>2016</td>
<td>18,5</td>
</tr>
</tbody>
</table>

(milk deficit according to LRS Bonn, 2009)

 Uses:
BEWI-MILK® Piglet as a supplementary feed from the first week of life.

- With lactic acid bacteria to stabilise intestinal flora
- Highly soluble and suitable for use with machines
- Tasty and very digestible
- For well-grown, healthy piglets
- Reduces the risk of diarrhoea

21.5 % crude protein
16 % crude fat
3.3 Rearing orphan piglets/ fostering

Fostering is necessary because of increasing litter size and the associated milk deficit, and also because some sows die after giving birth. In practice, technical solutions (fostering machines) are increasingly used for this purpose.

The aim is to provide piglets with an adequate amount of milk, giving them the best basis for growth. The switch from the mother sow to a fostering machine is a particularly critical phase as piglets face considerable stress and a change in diet. This is why it is essential that the piglet milk is the best possible match for the piglets and for the way it will be administered.

**BEWI-MILK® Piglet Cup**

Milk replacer feed for piglets to supplement or substitute for sows’ milk

- Optimised for use in fostering machines
- High milk protein content
- Stabilises intestinal flora

**Uses:**

**BEWI-MILK® Piglet Cup** as a feed supplement from the first week of life. Optimised for use in automatic feeding systems such as cup systems

- 21.5 % crude protein
- 12.7 % crude fat
The bacterium Streptococcus suis is one of the most common pathogens on pig farms. Animals are most at risk during the suckling and weaning phases. This is why antibiotic use is high in piglet production in order to combat streptococcal infections.

Piglets are normally infected during or just after birth. The germs enter the animal through tiny wounds, the navel, the gastrointestinal tract and the respiratory tract.

### 3.4 Piglet losses due to streptococci

Streptococci cause a wide range of conditions. They can lead to pneumonia, arthritis, meningitis and even sudden death.

**Pathogenic Entry Ports:**
- **Mouth:** (Pathogens are present on the vaginal mucosa, and piglets can become infected with streptococci when they are born)
- **Ears:** (e.g. through eartag perforation, i.e. poorly applied tag)
- **Wounds:** (e.g. castration wounds, newly docked tails, injuries after fights to settle ranks)
- **Joints:** (e.g. on chafed carpal joints)
- **Navel:** (open navel at birth)

**Streptococcal infection in piglets:** Infections can enter via the following entry ports:

---

**The effect of medium-chain fatty acids on the growth of pig-specific pathogenic germs in vitro**

**Recent study:**

Medium-chain fatty acids and their derivatives are known to be powerful inhibitors of gram-positive bacteria. Synergistic effects can also be achieved by a targeted combination of the active substances. A recent study investigated the effect of various medium-chain fatty acids on the growth of pig-specific pathogenic germs in vitro.

**Minimum concentrations of active ingredients tested at which in-vitro bacterial growth fell by 50 %**

<table>
<thead>
<tr>
<th>MIC&lt;sub&gt;50&lt;/sub&gt; in %</th>
<th>Escherichia coli</th>
<th>Streptococcus suis</th>
<th>Salmonella poona</th>
<th>Clostridium perfringens</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBC10 (60:40)</td>
<td>0.3 %</td>
<td>&lt;0.2 %</td>
<td>&gt;1.0 %</td>
<td>0.1 %</td>
</tr>
<tr>
<td>Lauric acid (C12)</td>
<td>0.2 %</td>
<td>0.2 %</td>
<td>0.2 %</td>
<td>0.1 %</td>
</tr>
<tr>
<td>Myristic acid (C14)</td>
<td>0.2 %</td>
<td>0.2 %</td>
<td>0.4-0.8 %</td>
<td>0.3 %</td>
</tr>
<tr>
<td>Glycerol monolaurate (GML)</td>
<td>0.4 %</td>
<td>0.1 %</td>
<td>0.6 %</td>
<td>0.1 %</td>
</tr>
<tr>
<td>BEWI-FATRIX SynerG⁺®</td>
<td>0.4 %</td>
<td>0.1 %</td>
<td>0.6 %</td>
<td>0.1 %</td>
</tr>
<tr>
<td>Combination product 1</td>
<td>&gt;0.6 %</td>
<td>&gt;0.6 %</td>
<td>&gt;0.6 %</td>
<td>0.2 %</td>
</tr>
<tr>
<td>Combination product 2</td>
<td>0.5 %</td>
<td>0.6 %</td>
<td>&gt;0.6 %</td>
<td>0.2 %</td>
</tr>
</tbody>
</table>

**BEWI-FATRIX SynerG⁺®** is more effective than any other combination available against gram-positive bacteria. In vitro, a concentration of just 0.1 % of **BEWI-FATRIX SynerG⁺®** is sufficient to reduce Streptococcus suis growth by 50 %. 
Activated lauric acid

BEWI-FATRIX SynerG+® is a matrix-encapsulated combination product based on lauric acid and plant extracts. The lauric acid used works as an activated component which specifically inhibits gram-positive bacteria. However, the ability of lauric acid to penetrate bacterial cells as a free fatty acid is limited. The SynerG+ factor, a special combination of active ingredients, helps to open the gram-positive bacteria (door-opener). The lauric acid can penetrate the cell and cause hyperacidification, which kills the cell.

BEWI-FATRIX SynerG+® penetrates and destroys the lipid layer of gram-positive bacteria

BEWI-FATRIX SynerG+®

Matrix-encapsulated combination product based on lauric acid and plant extracts

- Optimises rearing and improves the health status of animals
- As activated component, lauric acid specifically inhibits gram-positive bacteria (G+)
- This special combination with aromatics (plant extracts) provides proven synergies
- The matrix encapsulation ensures that all active ingredients reach their desired destination
- Very good processing and storage properties due to special production process
- Free-flowing and easy to dose

Uses:
For mild to high infection pressure caused by gram-positive bacteria (e.g. streptococci).

- Sows: feed up to 4 kg of BEWI-FATRIX SynerG+® per 1,000 kg complete feed
- Piglets: feed up to 5 kg of BEWI-FATRIX SynerG+® per 1,000 kg complete feed
- Fattening pigs: feed up to 4 kg of BEWI-FATRIX SynerG+® per 1,000 kg complete feed
4.1 Benefits of whey-fat concentrates

The combination of refined fats, dairy products and high-quality functional proteins offers a high physiological and energy benefit.

- All components can be easily digested by piglets from birth.
- As they are easily digestible and rich in valuable components, they encourage high daily weight gain, leading to healthier piglets, rapid activity and lower piglet losses.
- **BEWI-PIG® concentrates** also make feed more appealing because of the careful component selection.

The **BEWI-PIG®** range is specially suited to the particular properties of the still-developing digestive system of piglets.

4.2 How fat concentrates are produced

The unique technology of our spray-freezing process (see diagram) allows us to incorporate very high levels of easily digestible fats into our products. The products have excellent flow properties and absorb remarkably little moisture.

Spray-freezing fats

**Manufacture**

1. The hot vegetable fat is added
2. It is sprayed through special nozzles
3. It passes through various temperature stages
4. Fine crystalline fat concentrate
4.3 Our BEWI-PIG® whey-fat concentrates

**BEWI-PIG® 80 L**
Combination product of high-quality sweet whey, refined vegetable fats and lecithin
- Optimal preparation of piglets for a high back-fat quality
- High-energy feed for the best piglet yields
- Lecithin as an emulsifier improves the digestibility of fat and facilitates metabolism
- High level of medium-chain fatty acids for optimum digestion

Uses:
BEWI-PIG® 80 L can account for up to 8 % of the mixture.

**BEWI-PIG® 50 L**
Whey-fat concentrate for piglet feeding
- Combination product for use in piglet feed
- Lecithin guarantees maximum digestibility
- Pulverised in a spray-freezing process for maximum digestibility
- High lactose content makes it taste good and easy to digest

Uses:
BEWI-PIG® 50 L can account for 2 to 8 % of the mixture.

**BEWI-PIG® 20-20**
Combination product for producing high quality piglet feed
- High security due to low pH-value (4.5 to 4.7)
- High quality whey protein guarantees high digestibility and increases immunity
- Rich in glutamine to support the intestinal villi
- Lactose is easy to digest and very tasty
- Refined vegetable fats are a very good energy source with an excellent fatty acid profile

Uses:
BEWI-PIG® 20-20 can account for up to 25 % of the total ration.

**BEWI-PIG® 35-11**
All-rounder for supplementation of high-quality piglet feed
- Contains high-quality dairy products
- Refined vegetable fats are a first-class source of energy
- With high-quality crushed protein sources
- Very low levels of anti-nutritive ingredients
- Flexible use

Uses:
BEWI-PIG® 35-11 can account for up to 30 % of piglet rearing feed I and 15 % of piglet rearing feed II.
We offer our partners individual solutions to produce high-quality piglet feed concepts based on years of experience. This is based on easily digestible, tasty components and ingredients which ease the transition from sows’ milk to dry feed and ensure a good start to rearing.

We find the best solution for each customer. Talk to us!

Tailor-made solutions are our strong point

Feed recommendations

Energy supply for a breeding sow with a large litter

<table>
<thead>
<tr>
<th>Litter weight gain:</th>
<th>3.57 kg/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk production:</td>
<td>14.6 kg/day</td>
</tr>
<tr>
<td>Requirement</td>
<td>135 MJ ME</td>
</tr>
<tr>
<td>Intake</td>
<td>112 MJ ME</td>
</tr>
<tr>
<td>Mobilisation</td>
<td>16 MJ = 0.9 kg/day</td>
</tr>
<tr>
<td></td>
<td>= 22 kg in 25 days</td>
</tr>
</tbody>
</table>

Recommendations for daily feeding of lactating sows

<table>
<thead>
<tr>
<th>Litter weight gain (kg/day)</th>
<th>2.0</th>
<th>2.5</th>
<th>3.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liveweight per sow (kg)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>185</td>
<td>60</td>
<td>75</td>
<td>90</td>
</tr>
<tr>
<td>205</td>
<td>62</td>
<td>77</td>
<td>91</td>
</tr>
<tr>
<td>225</td>
<td>64</td>
<td>78</td>
<td>93</td>
</tr>
<tr>
<td>245</td>
<td>65</td>
<td>80</td>
<td>95</td>
</tr>
<tr>
<td>265</td>
<td>67</td>
<td>82</td>
<td>96</td>
</tr>
<tr>
<td>285</td>
<td>69</td>
<td>83</td>
<td>98</td>
</tr>
</tbody>
</table>

Figures in MJ ME/day

Suckling period 25 days, liveweight loss of 20 kg/sow

Effect of piglet numbers on milk production

<table>
<thead>
<tr>
<th>Number of suckling piglets</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily milk production by</td>
<td>86</td>
<td>93</td>
<td>100</td>
<td>107</td>
<td>113</td>
</tr>
<tr>
<td>the sow (rel. in %)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amount of milk available</td>
<td>107</td>
<td>103</td>
<td>100</td>
<td>97</td>
<td>95</td>
</tr>
<tr>
<td>per piglet and day (rel.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>in %)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily weight gains per</td>
<td>256</td>
<td>249</td>
<td>243</td>
<td>239</td>
<td>233</td>
</tr>
<tr>
<td>piglet (g)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Litter weight gain per</td>
<td>2.3</td>
<td>2.49</td>
<td>2.68</td>
<td>2.87</td>
<td>3.03</td>
</tr>
<tr>
<td>suckling day (kg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Average number of piglets weaned per sow 11, average milk production 11 l/day (100%), suckling period 25 days