



FRUIT STARCH SUGAR

The natural upgrade

Corporate Presentation
ActiBeet ®

DIS DELWAN INNOVATION SERVICES LTD ŞTİ
MANSUROĞLU MAH,1593/1 SOK,N:4/68 35535 BAYRAKLI - İZMİR,TURKEY.
TEL: +905456691930/+90 553 657 47 50





ABOUT US

AGRANA FACTS

- We refine agricultural raw materials, turning them into a range of different industrial products to supply local producers as well as large multinational companies active in the food and feed processing industry, in particular
- We also serve the end-consumer market in the Sugar segment with country-specific brands such as „Wiener Zucker“ in Austria


9,400
employees


57
production sites


2.5 €bn
revenue



World market leader in the production of

FRUIT

SUPPLIER PREPARATIONS



Major manufacturer of customer-specific

STARCH

PRODUCTS



Leading

SUGAR

SUPPLIER

In Central, Eastern & South-Eastern Europe



STRATEGIC POSITIONING B2B

WE ALL CONSUME AGRANA PRODUCTS

At the beginning there is always agriculture...



AGRANA refines agricultural raw materials...



AGRANA supplies the Big Names...



confectionery, beverage, fermentation industries, food retailers; paper, textile, pharmaceutical industries; feed industry; dairy, ice-cream, bakery industries and many more



We all consume AGRANA every day...





AGRANA-PRODUCTS IN DAILY LIFE AT A GLANCE

FRUIT



- fruit preparations in dairy products, ice-cream, in baked goods or as fruit decoration
- fruit juice concentrates in soft drinks and alcoholic beverages

STARCH



- as food ingredients, e.g. for sauces, potato products etc.
- as child and infant food
- for cosmetic products
- for technical applications, e.g. for paper finishing
- as animal feeds
- for bioethanol

SUGAR



- for consumers: „Wiener Zucker“ (20%)
- for food producers: e.g. for pastries, confectionery, dairy products, preserves, drinks etc. (80%)

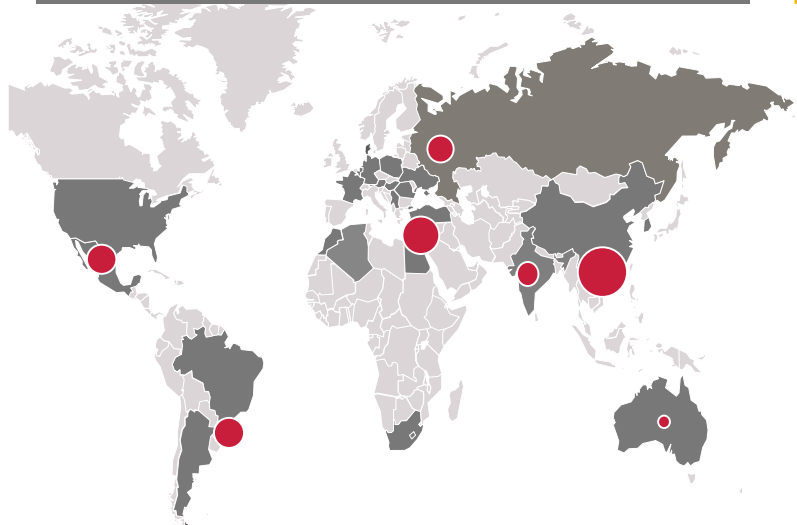


INTERNATIONAL PRODUCTION MEETS INT. CUSTOMERS

57 PRODUCTION SITES WORLDWIDE

FRUIT

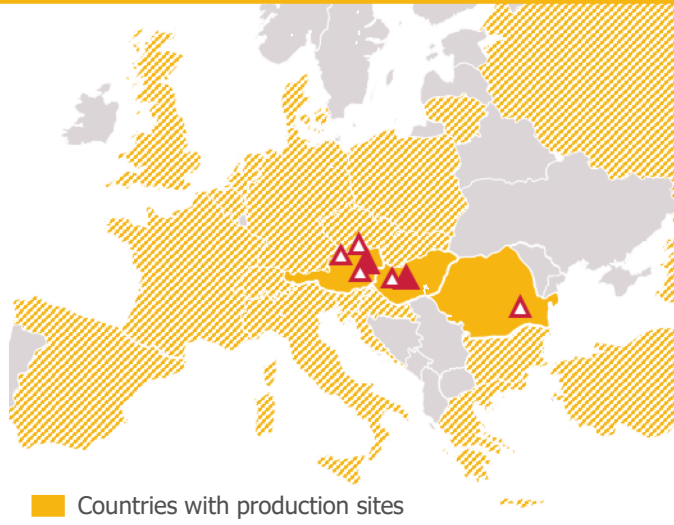
27 fruit preparation plants and
15 fruit concentrate plants



- Countries with production sites
- Potential Growth Regions

STARCH

5 starch plants
(incl. 2 bioethanol plants)



- Countries with production sites
- ▨ Main markets
- ▲ Starch plants
- ▲ Bioethanol plants

SUGAR

7 sugar beet plants
2 raw sugar refineries &
1 Instantina plant



- Countries with plants
- ▨ Other markets
- Beet sugar plants
- Raw sugar refinery
- Distribution centre
- * Also with refining activities



AGRANA'S BY PRODUCTS FOR THE FEED INDUSTRY



Sugar

- Dried sugar beet pulb
- Sugar beet pellets
- Betaine Molasses
- Crystalline Betaine
- Bee feed



Starch

- ActiProt – DDGS
- Corn gluten feed
- Corn gluten meal
- Maize germs
- Potatoe protein
- Wheat bran
- Wheat gluten
- Actigrano - Wheat gluten feed



JOINT VENTURE

AGRANA & AMALGAMATED SUGAR



AGRANA & AMALGAMATED SUGAR DEVELOPMENTS

HISTORY

- In the early **1990s**, **AGRANA invested in a molasses desugarisation** - to generate more sugar
 - Technology of ARI (Amalgamated Research Institute) without the possibility to derive betaine
- **Change to Finnfeeds** (now Dow Dupont) **technology** in the **year 2000/2001** to generate also liquid betaine from the molasses (exclusive sales to Finnfeeds)
- In **2013**, **AGRANA decided to switch back to the ARI technology**
- Worldwide, there are only two suppliers (ARI and Dow Dupont) for the technology to derive natural betaine in the form of liquid betaine or crystalline betaine from sugar beet molasses
- **AGRANA has been producing liquid betaine with ARI technology since June 2015**



AGRANA & AMALGAMATED SUGAR DEVELOPMENTS

TASCO

- Raw material availability (2/3)
- Technology providers, patent owner
- Experience in production since 2005
- Service (technical support, ..)
- Exclusivity for the establishment of a betaine crystallisation in Europe

JV



AGRANA

- Raw material availability (1/3)
- Production location in the EU for 99 years (Tulln)
- Experience in chromatography and crystallization
- Expertise in sales (FM, LM, cosmetics)
- Service (purchasing, sales, payroll, infrastructure,..)
- Betaine is sold exclusively by AGRANA Sales and Marketing



AGRANA & AMALGAMATED SUGAR JV – PARTNER

- The roots of the **Amalgamated Sugar Company** date back to 1897
- TASCOC is the **second largest sugar beet processor in the US** and has approximately 180,000 hectares of plantations in Idaho, Oregon and Washington in the cooperative, giving it **1 million tonnes of sugar**
- Since 1997, **Snake River Sugar Company** has 100% **operational control of the Amalgamated Sugar Company** and since 2018 100% ownership, making it the parent company of the Amalgamated Sugar Company
- **Snake River Sugar Company is a cooperative** of more than 750 sugar beet growers in Idaho, Oregon and Washington





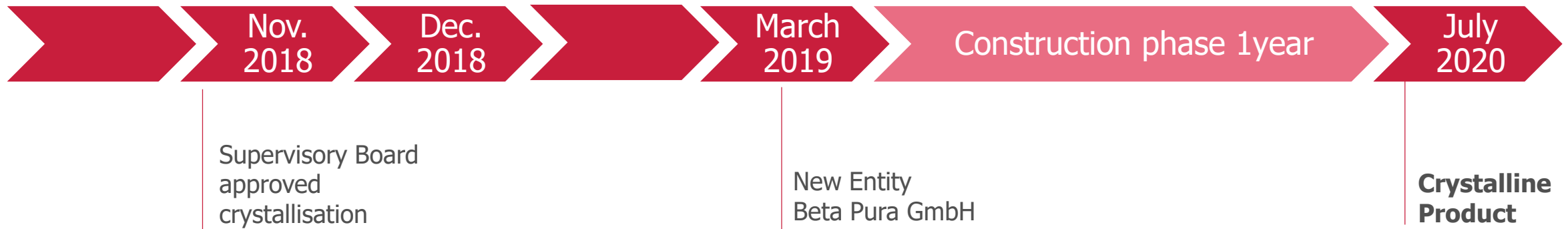
TIME FRAME

BETAINE CRYSTALLISATION

Joint venture: 50% Agrana : 50% Amalgamated

Antitrust authority: 2 – 4 month

Press release
14th December





BETAINE- CRYSTALLISATION





TULLN

1. Sugar Production

2. Desugarisation

3. Crystallisation



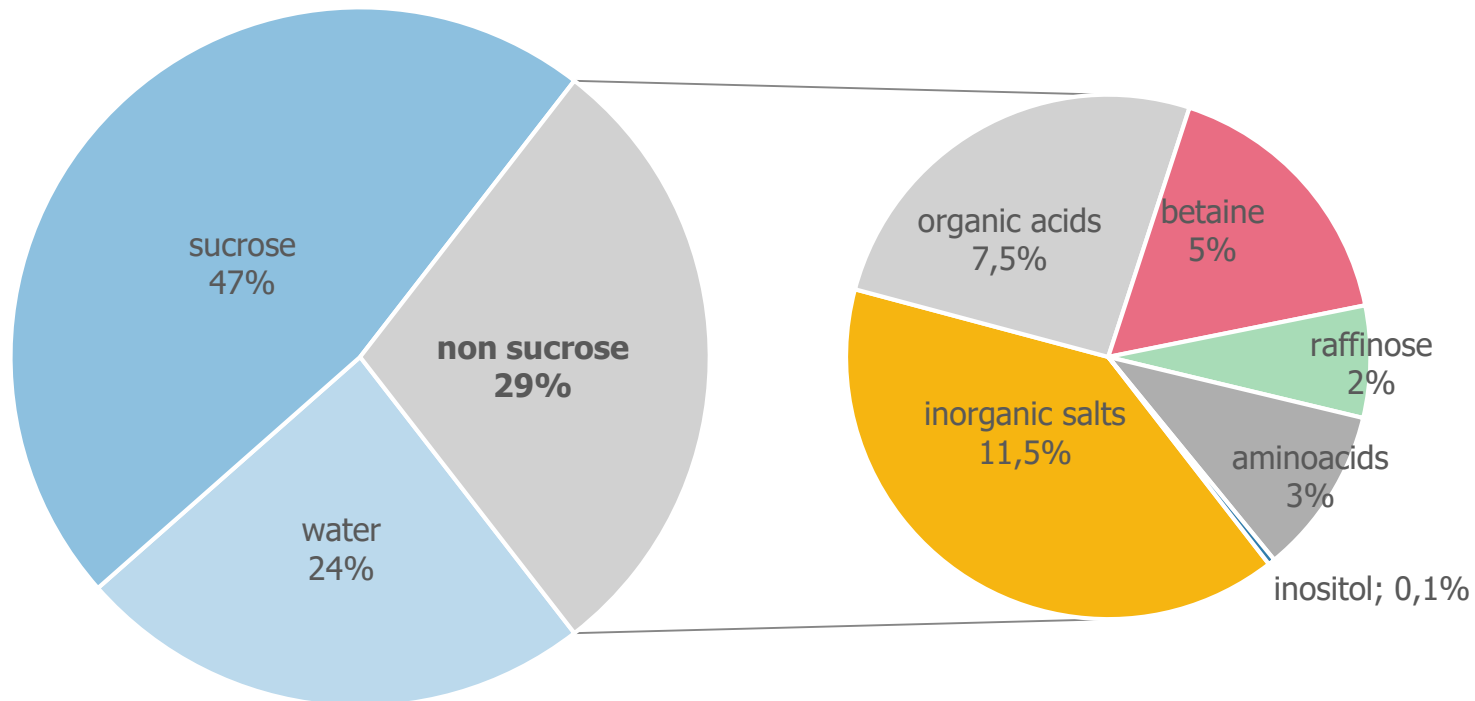
AGRANA Sugar GmbH





PRODUCTION OF MOLASSES

COMPOSITION OF MOLASSES



Betaine molasses
(app. 20 t/d; 53% DS)

Sugar fraction
(app. 150 t/d; 68% DS)

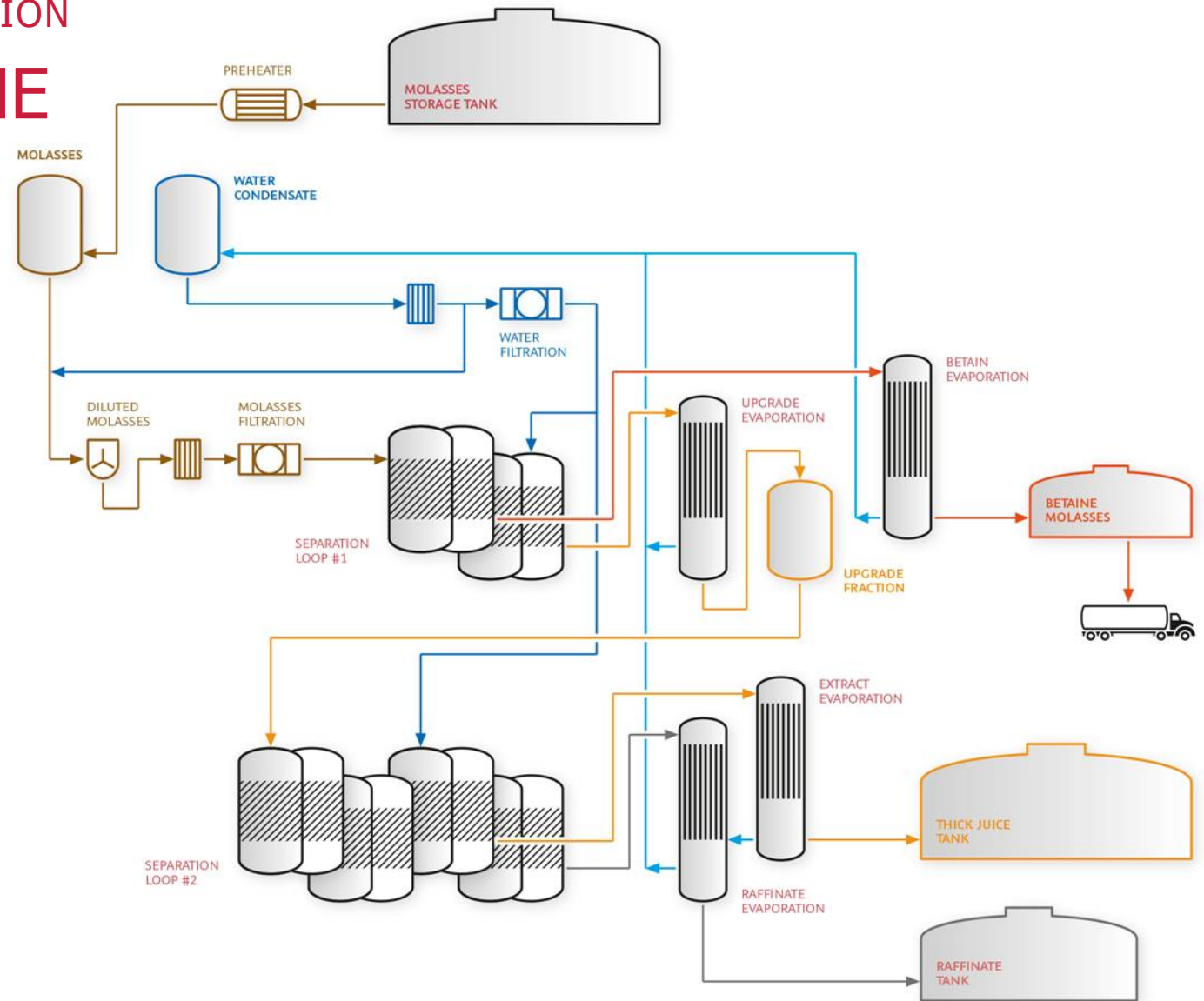
Raffinate
(app. 100 t/d; 72% DS)

Molasses
(app. 225t/d; 82%DS)



MOLASSES DESUGARISATION LIQUID BETAIN

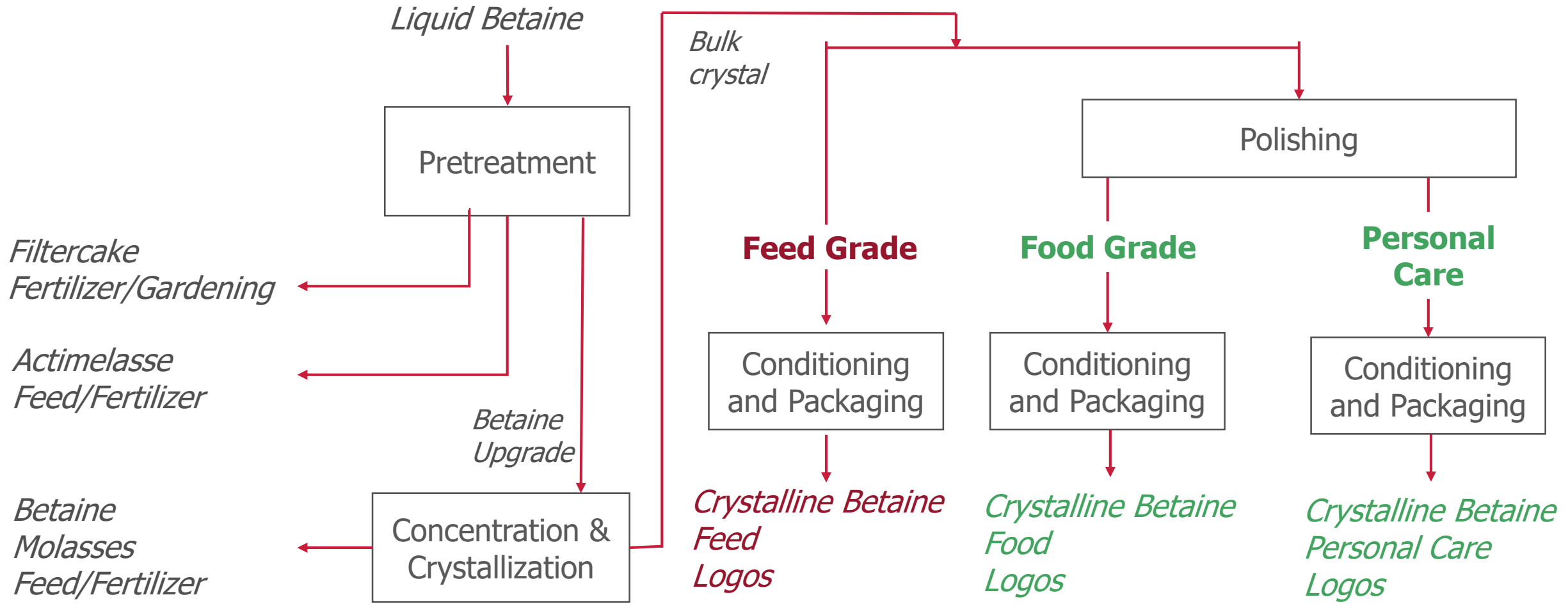
- To generate more sugar from the by-product molasses, the molasses runs via a molasses desugarisation
- Within molasses desugarisation the following products are derived
 - thick juice II
 - residual molasses
 - and **liquid betaine** will be derived





BETAINE CRYSTALLISATION

SIMPLIFIED PROCESS FLOW DIAGRAM





BETAINE







PRODUCTS





BETAINE BRANDS

OVERVIEW

| Feed | Food | Personal Care |
|--|---|--|
|  |  |  |
| <ul style="list-style-type: none">• Betaine anhydrous 97%• Betaine anhydrous 96% plus anti-caking agent | <ul style="list-style-type: none">• Betaine anhydrous 99% | <ul style="list-style-type: none">• Betaine anhydrous 99%• Betaine monohydrate 99% |
|  |  |  |
| <ul style="list-style-type: none">• Existing brand• creating awareness for NATURAL betaine product | <ul style="list-style-type: none">• Currently in check by the EU IP office• Aim is to communicate natural and plant based multifunctional ingredient | <ul style="list-style-type: none">• currently in check by the EU IP office• Aim is to communicate natural and plant based cosmetic ingredient |



ActiBeet® 96

- 96% betaine content
- Betaine anhydrous
- Anticaking agent: Calciumstearat
- Premixture

ActiBeet® green

- 96% betaine content
- Betaine anhydrous
- Anticaking agent suitable for organic farming
- Premixture

ActiBeet® 97

- 97% betaine content
- Betaine anhydrous
- Pure, no anti-caking agent
- Feed additive

Package size: 20 kg PET bags + Big Bags
Certified: ISO9001:2008, GMP+ and GMO-free

ActiBeet® green and 97 are allowed to use in organic feed



 **ActiBeet®**

The ActiBeet logo consists of a red icon of a beet root with two green leaves, followed by the brand name "ActiBeet" in a bold, red, sans-serif font, and a registered trademark symbol (®) to the right.



ACTIBEET® – NATURAL SOURCE OF BETAINE

INTRODUCTION

Betaine or trimethylglycine (TMG)

- First discovered in the juice of sugar beets (*Beta vulgaris*) -19th century
- Present also in other plants, animals and microorganisms





INTRODUCTION

ACTIBEET® – NATURAL SOURCE OF BETAINE

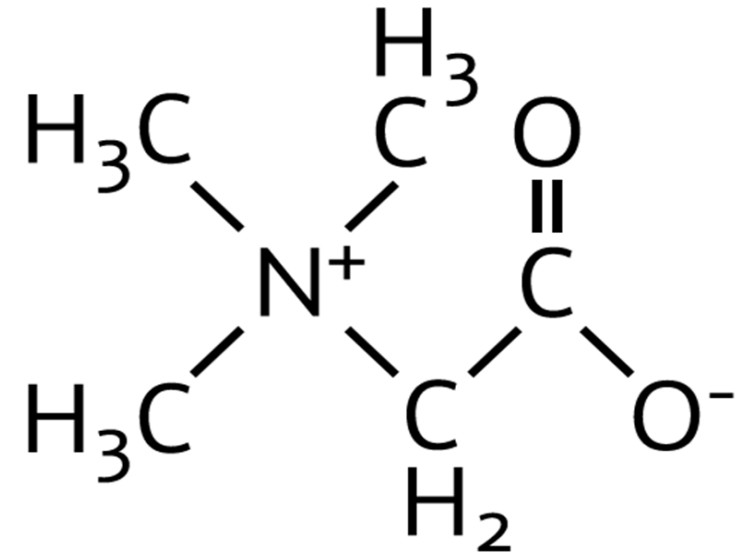
Betaine or trimethylglycine (TMG)



... has two main physiological functions:

1 Methyl group donor

2 Organic osmolyte



Betaine



INTRODUCTION

ACTIBEET® L – NATURAL SOURCE OF BETAINE

1 Methyl group donor

Methyl groups- *are essential in the animal diets, since vertebrates are unable to synthesise methyl groups; vital for maintenance and performance (production of meat, milk and eggs) .*

Potential dietary sources of methyl groups are:

- **Betaine - from natural or synthetic source;** it is more effective in the transmethylation than other potential methyl group donors such as methionine and choline;
- **Choline – from Choline chloride- synthetic source;** Choline as a methyl group donor is oxidized to betaine via two enzymatic steps, therefore betaine is the most efficient methyl group donor;
(References are available)



ACTIBEET®

METHYL GROUP DONOR

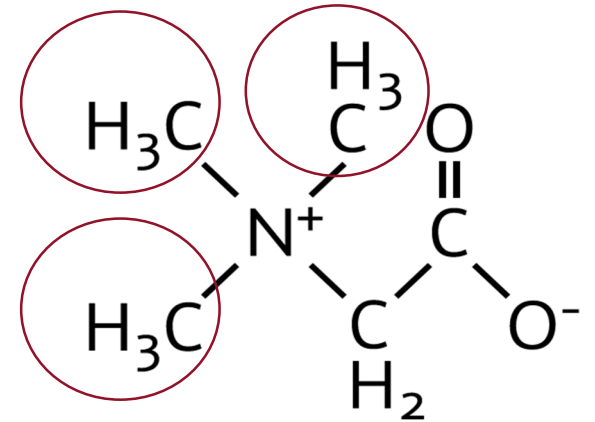
Betaine as a methyl group donor- is a catabolic source of methyl groups via transmethylation, for use in many biochemical pathways:

➤ **in the homocysteine - methionine cycle**

- *converts homocysteine into methionine; can reduce the requirements for other methyl group donors*

➤ **supports the synthesis of metabolically active substances**

- *like carnitine, creatine, with significant role in hepatic protection (prevention of Steatosis Hepatis Disease, known as fatty liver)*



Betaine



ACTIBEET®

METHYL GROUP DONOR

1. Betaine as an efficient methyl group donor:

➤ **works as an lipotropic agent**

- promotes the export of fat from the liver with positive effects on performances and carcass quality

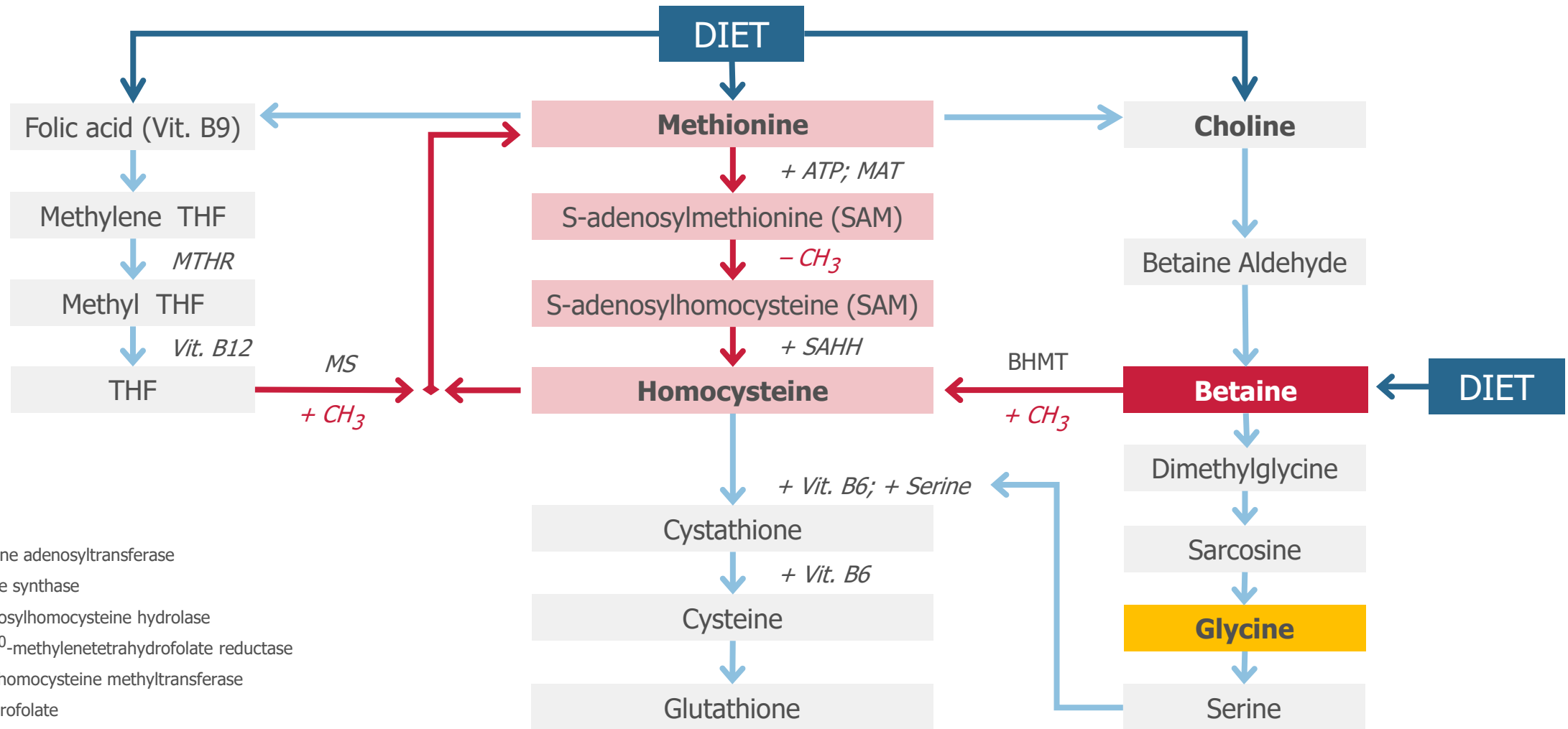
➤ **source of glycine- relevant in N- reduced feeding**

- glycine, is one of the amino acids present in the bile salts. One of its functions is to produce uric acid to eliminate the excess of nitrogen from the body via the urine



ACTIBEET®

METHYL GROUP DONOR



MAT – Methionine adenosyltransferase

MS – Methionine synthase

SAHH – S-adenosylhomocysteine hydrolase

MTHR – N⁵, N¹⁰-methylene tetrahydrofolate reductase

BHMT – Betainehomocysteine methyltransferase

THF – Tetrahydrofolate



FUNCTIONS OF LIVER

Hormones metabolism

Detoxification center

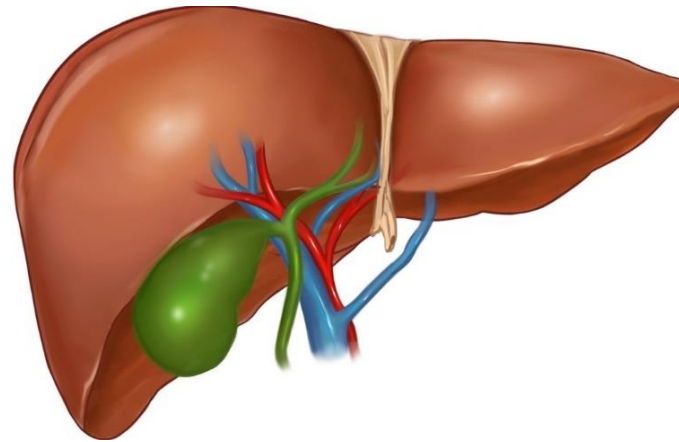
Fat metabolism

Fat digestion

Protein metabolism

Blood reservoir

Energy metabolism



Storage of vitamins



ACTIBEET ®

ORGANIC OSMOLYTE

Osmoregulation:

The ability of a cell to maintain its structure and function by regulating movement of water in and out of the cell

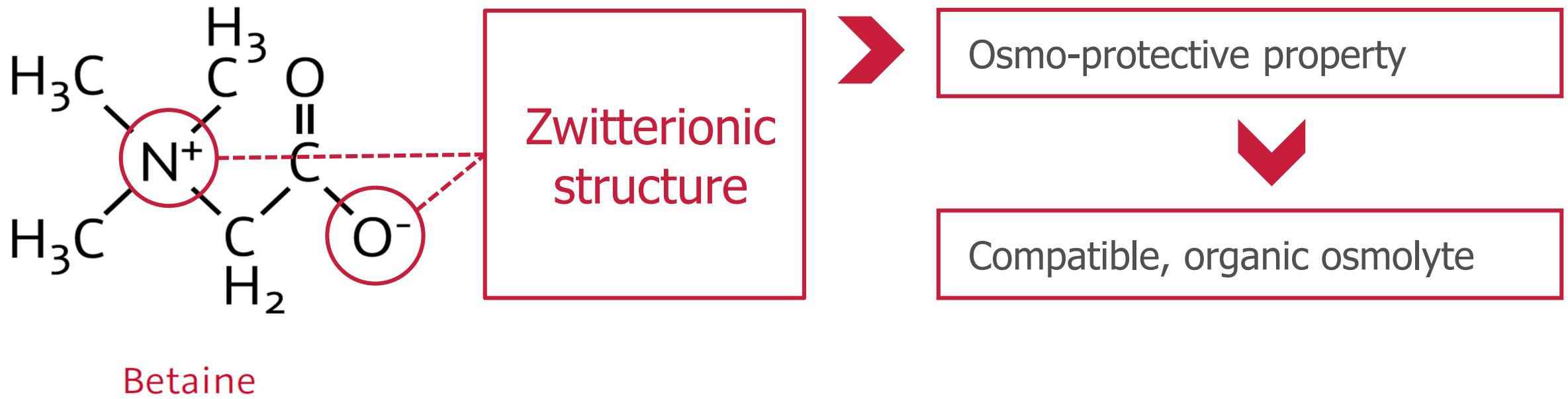




ACTIBEET®

ORGANIC OSMOLYTE

Betaine as an osmoprotectant in the osmoregulation:

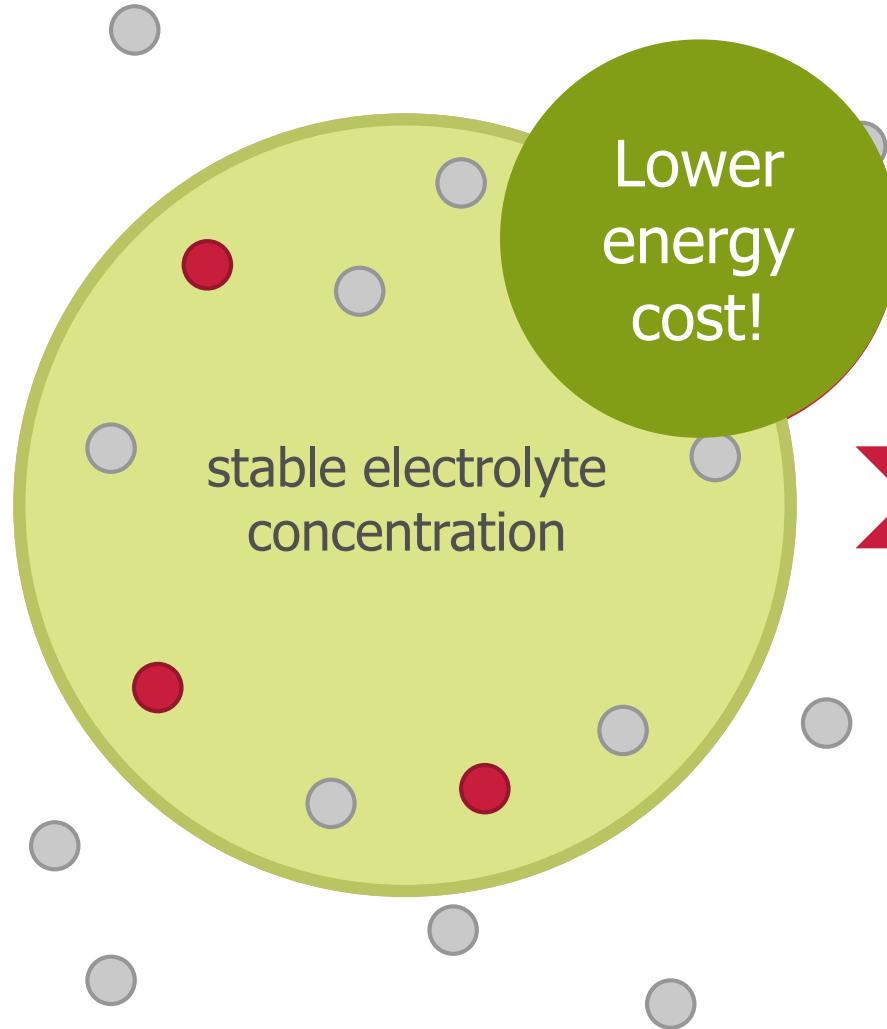




ACTIBEET®

CHALLENGES OF HYPEROSMOTIC STRESS

Increased
ActiBeet® L
in the cell



Perturbing inorganic ions are replaced by betaine as organic osmolyte
Depressed flux of metabolism of the cell

Water balance maintained

Cell volume restored and maintained

ELECTROLYTE



BETAINE

NATURAL BETAINE vs SYNTHETIC BETAINE

| | Natural source of betaine - ActiBeet® L | Synthetic source of betaine |
|--------------------|---|--|
| Production process | natural product, obtained from GMO-free sugar beet molasses via a chromatographic separation process. | synthetic chemical product, as the result of a chemical reaction between betaine and hydrochloric acid (HCL); or Trimethylamine (TMA) and monochloroacetic acid (MCA); or TMA; MCA, ethylene oxide and HCl |
| Residues | very low concentration- only native | depending on the production process- high or very high concentration |
| TMA content | very low TMA content 20-25 mg/ kg; only native | higher TMA content 200 -1730 mg/ kg |
| Chloride content | low chloride content - only native 0,03% | high chloride content $\geq 14,5\%$ |

- TMA can lead to undesirable 'fishy eggs' in layers, particularly in strains of hen deficient in trimethylamine oxidase
- Chloride negatively influence the osmolytic function; can disrupt cellular water balance and interfere with betaine's key osmolytic function, leading to wet litter and poorer performance



ACTIBEET ® THE NATURAL CHOICE

WHY ADD ACTIBEET THE NATURAL BETAININE SOURCE?

- ✓ Natural product – not chemically synthesised
- ✓ Applicable in organic feed production
 - Only natural betaine as betaine anhydrous (3a920) is applicable in organic feed production according to the Regulation (EU) 2019/2164.
- ✓ Improved livestock growth, especially in warmer climates
 - Better carcass yield (pork / beef)
 - Better breast meat yield (poultry)
- ✓ Non-aggressive in vitamin and mineral premixes
- ✓ Multi-species applications; soluble form for drinking water applications
- ✓ Consistent, guaranteed betaine levels
- ✓ Safe to handle
- ✓ Easy handling, no storage tanks necessary
- ✓ Shorter transport routes than synthetic betaine from China → lower carbon footprint



ACTIBEET ® THE NATURAL CHOICE

