“MENOSO 30”
--Encapsulated Sodium butyrate 30%

R&D Center：Xie Fei （产品研发中心：谢飞）
1. The background knowledge introduction of Sodium Butyrate

2. The reasons for using sodium butyrate in livestock industry

3. The market information analysis of Sodium Butyrate

4. Introduction of Menoso 30
1.1 The introduction of Sodium Butyrate

(1) What is Sodium Butyrate?

✓ Sodium butyrate is also called sodium n-butyrate, which is the sodium salt form of butyric acid; Molecular Formula: CH3 - CH2 - CH2 – COONa

✓ Products mainly came chemical synthesis, namely: acid-base neutralization reaction; currently the most important production processes are spray drying processes (see below);
The applications of Sodium Butyrate

1. The background knowledge introduction of Sodium Butyrate

1.1 The introduction of Sodium Butyrate

(2) The applications fields of Sodium butyrate

Chemical Industry

The chemical materials (e.g.: Chemical reagents)

Feed industry

Pharmaceutical Industry

As the clinical drug, which is mainly used in the treatment of diarrhea, enteritis and colon cancer

Sodium butyrate is one of both domestic as well as foreign varieties permitted feed additives.
Butyrate acid is a metabolite of enteric microorganisms.
Butyric acid is vital for physiological function.
The disadvantage of butyric acid application can be improved by sodium butyrate.

Increased theoretical research and application test promote the prevalent application of sodium butyrate in livestock production.

Scholars in Italy first adopted sodium butyrate in animal production in 1980s.

- Used for parenteral nutrition, dieahrea, enteritis, intestinal cancer clinic care.
1. The background knowledge introduction of Sodium Butyrate

1.3 The application of sodium butyrate in the animal production

The product of Sodium butyrate used more and more widely in the livestock industry.
1. The background knowledge: Introduction of Sodium Butyrate
2. The reasons for using sodium butyrate in livestock industry
3. The market information analysis of Sodium Butyrate
4. The client development case sharing (marketing strategy) in 2014
2. The reasons for using sodium butyrate in livestock industry

2.1 The introduction of animal intestinal function

(1) Digestive tract / gut / Intestinal

- Intestinal introduction
  - From gastric pylorus to rectum
  - The longest part of the digestive tube
  - The most important part

- Intestinal structure
  - Including small and large intestine
  - Small intestine: duodenum, jejunum, ileum
  - Large intestine: cecum, colon, rectum
2. The reasons for using sodium butyrate in livestock industry

2.1 The introduction of animal intestinal function

(2) The function of Intestinal:

Digestion of nutrients in the intestine

Absorption of nutrients in the intestine
2. The reasons for using sodium butyrate in livestock industry

2.1 The introduction of animal intestinal function

(3) The importance of intestinal physiological function

Intestinal involvement in energy metabolism
Intestinal microbial action
Mucosal immune function
Barrier function
Nutrient absorption
Nutrient digestion

Conclusion:
Maintaining and improving the normal physiological function of the intestinal tract is important for the growth, development and health of animals.
2. The reasons for using sodium butyrate in livestock industry

2.2 What is a “healthy” Gastrointestinal tract?

- Optimal digestion and absorption function
- Microflora balance
- Effective barrier function
- Effective immune function
2. The reasons for using sodium butyrate in livestock industry

2.3 The growth characteristics of 70 days weaned piglets in the intensive pig production

(1) The source of nutrients for the piglet's growth and development is changed into complexity.

- Provided by the placental blood
- Provided by the mother's milk
- Provided by creep feed
- Provided by Nursery feed

(2) Continuous changes of the external environment in the process of growth and development of the piglet

- The womb environment
- Insulation incubator
- High bed rearing environment
- Rearing on floor environment
2.4 In the intensive pig production, the main problem the 70 days weaned piglets faced:

- **Average feed intake is low**
  - Feed intake: more than 800g/pig

- **Susceptible to intestinal diseases**
  - Diarrhea rate: about 5% (Large scale pig farm)
  - Transfer weight: 30kg/piglet

- **Easy to reduce weight gain**
  - About 10% (small scale pig farm)
  - Transfer weight: 25kg/piglet

- **Growth performance reduced**

- **post-weaning diarrhea**

期望：Diarrhea rate: no diarrhea

现状：Diarrhea rate: about 5% (Large scale pig farm)

Transfer weight: 30kg/piglet

Feed intake: 650-750g/d
2. The reasons for using sodium butyrate in livestock industry

2.5 what factors will affect gut health of animals?

The piglet suffered all sorts of stresses in the breeding process

- Weanling stress
- Stocking density
- Heat stress
- Feeding moldy feed
- Environment pathogenic microorganisms
- Anti-nutritional factors in feed
- Intestinal diseases

Intestinal damage
Intestinal epithelial cells damage
2. The reasons for using sodium butyrate in livestock industry

2.6 The negative effects of “stress” on the intestinal structure

The concept of intestinal damage:

Abnormal changes in structure and function can be considered Intestinal damage;

- Villus height reduction (abnormal shedding, breakage),
- Deepen crypt,
- Reduce the secretion of digestive enzymes
- Intestinal diseases

Damaged intestinal mucosal

Broken intestinal villus
2. The reasons for using sodium butyrate in livestock industry

The Damage form of Small intestine

Healthy intestinal mucosa

Damaged Intestinal Mucosa

Damaged villi
2. The reasons for using sodium butyrate in livestock industry

2.7 The negative effects of “stress” on the intestinal function

1. Villus shortening, deepened crypt (Influence absorption)
2. Reduce secretion of enzymes (Influence Digestive)
3. Damaged physical barrier (Influence barrier)
4. Disorders of flora balance (intestinal environment)
5. Changed mucosal morphology (Influence Intestinal structure and function)
6. Reduced feed intake, Decreased weight gain, Increased diarrhea, Chaos feather, Increased mortality
How to solve the intestinal damage or reduce intestinal damage in intensive farming?
2. The reasons for using sodium butyrate in livestock industry

Benefits of sodium butyrate

- Provide intestinal mucosal cellular energy to promote the proliferation and differentiation of epithelial cells
- Improve the growth of intestinal villi
- Stimulate the secretion of digestive enzymes
- Rapidly repair damaged intestinal epithelial cells protect the intestine

Effectively enhance the digestion and absorption of nutrients
Conclusion:

(1) Analysis form the mechanism of action, **acting directly on intestinal mucosal cell** (Provide energy for cell repair and growth), fast enough to solve the problem of intestinal damage;

- Probiotic, prebiotic acidifier, antibiotics, antimicrobial peptide
- Enzyme, lysozyme, glycoprotein, mucoitin, glycolipid, cholate, emulsifier, enteric soluble acidifier: regulate pH
- Sodium butyrate, glutamine
- Immune enhancer, plant extract, essential oil
- Microbiological barrier (commensal bacteria)
- Chemical barrier (mucus layer)
- Inner mucus layer (protected zone)
- Goblet cell
- Epithelial cell
- Immunological barrier (immune cells of the lamina propria)
- B-cell, Dendritic cell, Live bacterial cell
2.9 The application effect of sodium butyrate in livestock industry

- Increase intake
- Increase ADG
- Improve production performance
- Reduce diarrhea
- Reduced diarrhea after weaning
- Health Status
- Fur improving
Summary:
The advantage of sodium butyrate can promote intestinal health and development (for example piglet)

- Valid in theory;
- Numerous scientific studies from universities and research institutes;
- Product value can be experienced by farming people in Livestock;
- Use legally, Component clear, Detect easily.

2. The reasons for using sodium butyrate in livestock industry
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3.1 The present market competition status of sodium butyrate related products

(1) Current market presence of sodium butyrate related products?

What types of above two products?

- Powder sodium butyrate
- Micro-encapsulated sodium butyrate (the content of sodium butyrate: 30%)
3. The market information analysis of Sodium butyrate

Introduction of the domestic feed enterprise using sodium butyrate products

Feed companies using sodium butyrate

- Pig feed enterprise
  - 山东六和
  - 双胞胎
  - 大成集团
  - 通威集团
  - 东北饲料客户

- Broiler feed enterprise
  - 华都肉鸡
  - 大连韩伟
  - 和美华
  - 普瑞纳
  - 东北饲料客户

- Hen feed enterprise
  - 常州立华
  - 铁骑力士
  - ......

Why use?
- certainly effective, otherwise it will not use;
- Using sodium butyrate is to solve the problem;
- Using sodium butyrate is to Improve the quality of the feed;
The background knowledge introduction of Sodium Butyrate

The reasons for using sodium butyrate in livestock industry

The market information analysis of Sodium Butyrate

Introduction of Menoso
4. Introduction of Menoso

4.1 Why MENON research and development sodium butyrate?

Nutrition concept in the whole process: whole process of food intake, digestion, absorption and utilization of nutrients

Animal Nutrition
- Intake
- digestion
- absorption
- metabolism

The whole process of nutrition

Focus

- 调味剂——增加适口性
  提高饲料适口性，促进动物采食，增加采食量

- 酸化剂——提升消化能力
  提高饲料蛋白消化性，促进营养物质的利用，进而促进养殖动物的生长发育

- 香味剂——诱食作用
  赋予饲料动物偏嗜的气味，产生诱食作用，增加采食量

- 丁酸钠——促进吸收机能
  提高肠道的消化吸收机能，促进营养物质的利用，进而促进动物机体生长发育

全程营养理念——采食、消化、吸收以及营养物质利用的全过程
4.2 Introduction of Menoso

Encapsulated Sodium butyrate 30%
“MENOSO 30”

<table>
<thead>
<tr>
<th>Appearance:</th>
<th>Ingredient:</th>
</tr>
</thead>
<tbody>
<tr>
<td>white granule</td>
<td>Sodium butyrate vegetable oil silica</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Content:</th>
<th>Features:</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥30%</td>
<td>Slow release</td>
</tr>
</tbody>
</table>
4. Introduction of Menoso

4.3 Why research and development Encapsulated Sodium butyrate?

(1) The development of sodium butyrate

1. Powder Products
   - Foreign 1980s
   - 2003--2007
   - 2015--2016

2. Coated products
   - 2003--2013
   - 2015--2016

3. Tributyrin Products
   - 2003--2013
   - 2015--2016

4. Microencapsulated product
   - 2008-2016

Why there are different types of related products?
4. Introduction of Menoso

4.3 Why research and development Encapsulated Sodium butyrate?

(2) Disadvantages of powder form sodium butyrate

- Negative impact on storage
- Reduced amount of effective sodium butyrate reached intestinal tract
- Waste during feed processing, storage and transportation
- Dust during processing
- Moisture absorption
- Low utilization rate
- Stinky odour
- Inferior fluidity
- Low density
- Affect feed quality
Microcapsulary technology uses film-forming materials to coat solid or liquid materials to get small particles, called microcapsule.

- There are various microencapsulated granule, but most of them are spherical
- The particle diameter of microencapsule is usually among 20mesh-100mesh
Microencapsulation technique reduced the chance that sodium butyrate exposed to air and therefore cover the disadvantage of powder form sodium butyrate.
The advantage of microcapsule

- Reduce waste and improve stability of active ingredient
- Relatively stable in stomach ensures the particle to reach intestinal tract
- Eliminate the stinky flavour
- Decrease dust during production
- Solve the moisture absorption problem, easy to store

Part III: The development of sodium butyrate
4. Introduction of Menoso

Introduction of Menoso 30

- Reduce waste and improve stability of active ingredient
- Relatively stable in stomach ensures the particle to reach intestinal tract
- Eliminate the stinky flavour
- Decrease dust during production
- Solve the moisture absorption problem, easy to store
### The features of Menoso 30

**“MENOSO 30”**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>White or off-white solid particle</td>
</tr>
<tr>
<td>Odour</td>
<td>No unpleasant or pungent smell</td>
</tr>
<tr>
<td>Particle size</td>
<td>1.18mm to 0.18mm</td>
</tr>
<tr>
<td>Ingredient</td>
<td>Sodium butyrate, vegetable oil, silica</td>
</tr>
<tr>
<td>Content</td>
<td>Sodium butyrate $\geq 30%$</td>
</tr>
</tbody>
</table>
4. Introduction of Menoso

Slow-releasing effect of different types of sodium butyrate

Conclusions
1. Microencapsulated sodium butyrate has superior slow releasing property which ensures more SB reach the intestinal tract.
2. Compared with competitor’s product, Menoso 30 show better slow releasing effect (more advanced technique guarantees better coating effect).
4. How produce Menoso

4.5 How produce Menoso 30?

- Optimized product formula
- Advanced equipment
- Strict process
- Quality management
Part IV: Introduction of Menoso 30

4.6 The quality and management

Quality Management work

Quality Management System
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产品研发中心--谢飞