Adequate use of complex sugar in horses

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PAVESCO-TWYDIL
Complex Sugar

Lactulose

Inulin

Fructooligosaccharide

Molecular Structure of Glucosamine
A) Prebiotics

Definition:

- Non digestible feeds
- Fermentescible
  - Beneficial for health or well-being
- Specifically stimulate the microflora growth or activity
A) Prebiotics

- Lactulose
- MdOS
- FOS
- TOS
- MOS
- ...

Microflora → pH

VFA
A) Prebiotics

In balance ecosystem

Lactate producing
Lactobacillus
Streptococcus
...

Lactate utilizing
Selenomonas
Megasphaera
...

Pathogen or putrefying
Clostridium
E.coli
...

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Lactobacillus
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Pathogen or putrefying
Clostridium
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...
A) Prebiotics

- Improvement of the microbial quality of droppings
- Decrease of the risk of colic
- Optimisation of fermentation and pH
- Improvement of insulin sensitivity
A) Prebiotics

- Prevent dysbacteriosis following a change in feeding
- Reduce the risk of gastric ulcers
- Potentially improve colostrum quality
A) Prebiotics

- Improve epithelial barrier function (PRR agonist)
- Seem to improve normal cells development and function (VFA)
A) Prebiotics

- Use the right dose
- During the adequate period
- Target your population
A) Prebiotics

- Use the right dose (scFOS)
- 0.05g/Kg minimum
- Risk of laminitis over 2 to 5g/Kg
A) Prebiotics

- During the adequate period (10 days minimum)
- Target your population
- Stress
- Feed change
- Transport
- Competition
- Weaning
A) Prebiotics

TWYDIL® GROWING
TWYDIL® STUD
TWYDIL® HEMOPAR
TWYDIL® CALMIN
TWYDIL® MUCOPROTECT
TWYDIL® VIGORADE
TWYDIL® STOMACARE
B) Isomeric sugar

- Classification
  - Disaccharide of fructose and glucose
  - An isomer of sucrose

- Production: enzymatic conversion

\[
\begin{align*}
\text{Sucrose} & \quad \text{Palatinose} \\
\text{[Glucose]} & \quad \text{[Fructose]} \\
\text{[Glucose]} & \quad \text{[Fructose]}
\end{align*}
\]

\[\text{Isomerisation using an enzyme}\]
B) Isomeric sugar

Slow release sugars

Virtually complete digestion and absorption as glucose and fructose ...

⇒ provides the same calories

... but more slowly

⇒ lower and prolonged increase in blood glucose
B) Isomeric sugar
B) Isomeric sugar

![Graph showing plasma glucose change (mmol/L) and plasma insulin change (µIU/mL) over time for Sucrose and Palatinose™.](image)
B) Isomeric sugar

**Advantage:**

Reduction of insulin peak is beneficial even for young animals

**Prevention:**

- Tying-up
- Obesity
- Metabolic syndrome development
- Laminitis
- OCD
B) Isomeric sugar

<table>
<thead>
<tr>
<th>Feed manufacturer</th>
<th>Vs</th>
<th>Feed supplement</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 to 50 % amidon</td>
<td></td>
<td>30-50% of matrix</td>
</tr>
<tr>
<td>2 to 8% of sugar (molasses,…)</td>
<td></td>
<td>sugar (mostly dextrose)</td>
</tr>
<tr>
<td>Average of 4Kg/day</td>
<td></td>
<td>20 to 160g</td>
</tr>
</tbody>
</table>
B) Isomeric sugar

   TWYDIL® ARTRIDIL
   TWYDIL® CALMIN
   TWYDIL® ELECTROLYTES
   TWYDIL® MUCOPROTECT
   TWYDIL® PROTECT+
   TWYDIL® TWYBLID
   TWYDIL® VIGORADE

Significantly improved appetite
C) Amino-sugar

2-Amino-2-deoxy-D-glucose

Sulphate de chondroïtine
C) Amino-sugar

- **Glucosamine**
  - Synthesis of GAG / Proteoglycans
  - Expression of «inactive receptor for» IL-1

- **MMPs, aggrecanase, NO, PGE2**
  - Inflammatory response

- **Transcription factor of IL-1**
  - Degradation

- **Translocation NFκB → nucleus**
  - COX2, NO synthase, MMP

- **Synthesis of GAG / Proteoglycans**

- **Expression of «inactive receptor for» IL-1**
C) Amino-sugar

Chondroitin sulfate

- Lytic enzymes (activated by PGE2/NO)
- IL-1 \(\rightarrow\) collagen II/MMP
- Concentration en HA \(\rightarrow\) Synovial viscosity +++
- Synthesis of GAG
C) Amino-sugar

IN VITRO
MMP9 activity in synovial fluid

IN VIVO

* A
** B

TWYDIL ARTRIDIL
Placebo

MP means Metacarpo-phalangeal
EX VIVO

* Second experimentation made with double dose of TWYDIL ARTRIDIL

ISO PGF2α
MMP activity
NfKb and AP1*

+ IL1

* ** ** ** **

* Second experimentation made with double dose of TWYDIL ARTRIDIL
Isoprostane, MMP2 and NfKb$ production in cultured chondrocytes

$ Test with double dose of TWYDIL ARTRIDIL
C) Amino-sugar

TWYDIL®ARTRIDIL
C) Amino-sugar

Modulates the articular enzymatic balance

Decreases the expression of the main pro-inflammatory transcriptional factor
Conditions of efficacy

• Target the correct population
• Selection of the appropriate cocktail or molecule
• Dosage, duration of administration
• Lack of toxicity
• Lack of irreversible damages