What is Flexineeb?

- An easy-to-use delivery device that produces a very fine mist of aerosolized drug or natural therapy solutions

- Simple
- Rapid
- Silent
- Adaptable
- Comfortable
Current uses

- Frequently used to administer drugs to treat respiratory diseases such as:
  - Inflammatory Airway Disease (IAD)
  - Recurrent Airway Obstruction (RAO)
  - Exercise Induced Pulmonary Hemorrhage (EIPH)

- Treatment of sinusitis, acute and chronic guttural pouch infections, viral infections is also becoming more commonplace
Design - Medication cup

• Vibrating mesh technology – one of the most sensitive but also accurate methods of aerosol therapy in the world
• Vibrates 86,000 times per second
• Automatic tuning capability
• 3 versions available – grey, green and blue cups
Design - Mask

- The Flexineb® mask is unique in its soft flexible shell construction and allows easy comfortable fitting to the horse.
- A one piece design with integrated seal also makes it very easy to clean and disinfect which is important to avoid cross contamination and infection.
Design – Aerosol Chamber

• The aerosol chamber is designed to minimize contamination of nebulized drug so it is outside the Mask body.
• It is made intentionally transparent to enable visual feedback of aerosol generation and inhalation by the horse.
Design – Air Inlet Valve

- When the horse inhales, fresh air and the nebulized drug will be drawn from the aerosol chamber into the airways of the horse.
Design – Air Exit Valve

- The exit valve is specifically located at the bottom of the mask because it is close to the nostrils of the horse.
- Allows easy access when opening and closing the air vents by rotating the valve housing.
Design–Controller & Cable

- The controller is designed to run off a re-chargeable battery and has a one push button switch operation.
Flexineb 1 and Flexineb 2

• How to distinguish between Flexineb 1 and Flexineb 2

• System identification:
  – Flexineb 1 has a GREY power on/off button and “Flexineb” branded at the top
  – Flexineb 2 has a BLACK power on/off button and “Flexineb 2” or “Flexineb E2” at the top (E2 branding from Sept 2016)

• Flexineb 1 and 2 are two extremely different machines:
  – Operate at different voltage outputs and Flexineb E2 incorporates Automatic Tuning which optimizes tuning of the vibrating mesh
  – Flexineb 1 and 2 medication cups are manufactured separately and are not compatible as Flexineb 1 controller does not have automatic tuning capability to run an advanced Flexineb E2 medication cup
Data on particle size
Distribution through lungs

• 71% of the medication inhaled is five microns or less. This means that 71% of the drug will reach the lower airways.

*Scintigraphy imagery taken by Dr. Nathan Slovis at Hagyard Equine Medical Institute in Lexington. Who performed the imaging to reiterate the effectiveness and quality of therapy the Flexineb nebuliser achieves.
And it comes in pink!
Options Available

Small/Foal/Pony System
Muzzle circumference measurement 12” to 17” can be used with foals and small ponies. Available in Blue.

Standard/Medium Pink System
Muzzle circumference measurement 17” to 20” can be used with Thoroughbreds, Standardbreds, Quarter Horses and small Warmbloods.

Standard/Medium Blue System
Muzzle circumference measurement 17” to 20” can be used with Thoroughbreds, Standardbreds, Quarter Horses and small Warmbloods.

Large System
Muzzle circumference measurement 20” to 26” can be used with large Warmbloods. Available in Blue or Pink!
What does it nebulise?

- Delivers a range of drugs and natural therapies by converting them from a liquid to a very fine mist which is inhaled deep into the lungs
  - Corticosteroids
  - Antibiotics
  - Bronchodilators
  - Mucolytics
  - Natural therapies
Corticosteroids

• Three most common corticosteroids used with Flexineb® are:
  – FlixotideTM (Fluticasone Propionate) (nebulizer)
  – Dexameth (Dexamethasone) (IV solution)
  – Pulmicort® (Budesonide) (nebulizer)

• All should be diluted 1:1 with Saline (0.9% Solution) for ease of nebulization and to help increase the life of the replaceable medication cup.

• Studies have shown that by nebulizing Corticosteroids you can reach a far greater concentration of the drug directly into the lungs compared to MDIs, IV and IM injection*.

• Typically 25% less of the Injectable Corticosteroids solution is used when nebulizing**, in which only a small amount crosses the blood barrier, so there is a lower chance of systemic side effects associated with injected Corticosteroids such as Laminitis.


Antibiotics

• The most common Antibiotics used with the Flexineb®:
  – Cobactan® (Cefquinome)
  – Excenel® (Ceftiofur)
  – Gentaject (Gentamicin)

• All come as Injectable solutions
  – Cobactan® and Excenel® are nebulized neat (no dilution)
  – Gentaject is diluted 1:1 with Saline (0.9% Solution)

• All Antibiotics that have been used with the Flexineb® are for treating respiratory Infections
Bronchodilators

- Most commonly used bronchodilators in the Flexineb are:
  - Atrovent (Ipratropium)- nebule
  - Ventolin™ (Salbutamol/Albuterol) - nebule
  - Ventipulmin – injectable solution

- All should be diluted 1:1 with saline
- Can be used along with Corticosteroids and Antibiotics
- Bronchodilators relax the smooth cell muscle surface of the lungs during bronchoconstriction
Mucolytics

- Two mucolytics used with Flexineb are:
  - Parvolex (Acetylcysteine) – dilute 1:1 with saline
  - Saline (0.9% solution)

- Mucolytics help break up the mucus in the lungs
- By reducing viscosity of the mucus it is easier to remove
Natural therapy - Silverplex

- Natural solution - neat chelated silver
- It is vital is is delivered on its own – DO NOT DILUTE
- Silver is well recognized as having anti bacterial, anti-viral and anti-fungal properties
- Chelated silver means the particles are smaller so they can penetrate deep into the lungs - key for its success
- Aerosol droplet size testing carried out by Nortev showed 73% with < 5µm
- Offers a drug-free option to use - legal even while racing or competing FEI
Natural Therapy – Others

- Balsamic Air – contains essential oils and natural plant extracts selected for their antibacterial, anti-viral fluidizing and antispasmodic properties. Nutritional support formulated by AUDEVARD laboratories, can be nebulised when diluted 1:1 with saline.
- Saline with a few drops of Eucalyptos oil is a popular choice of natural therapy – may help open up the lungs and break down mucus.
- Hyalusol – contains hyaluronic acid with eucalyptus oil and isotonic solution – noted to help clear airways – do not dilute.
- Nebulin – turmeric based, designed to help manage respiratory disorders and reduce EIPH – do not dilute.
This chart is meant to be used as a guide for you and your veterinarian. Some of the medications listed are not available in all countries. It is recommended to always consult your veterinarian for advice regarding diagnosis and the treatment protocol for your horse.

### Antibiotics / Antifungal

<table>
<thead>
<tr>
<th>Drug</th>
<th>Trade Name</th>
<th>Drug Format</th>
<th>Dilute with 0.9% Saline</th>
<th>Standard Med Cup Colour Code *</th>
<th>Special Med Cup Colour Code For Shorter Delivery Time *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cefquinome</td>
<td>Cobactan®</td>
<td>Cobactan® 4.5% Injectable Solution</td>
<td>No</td>
<td>GREY</td>
<td>GREEN</td>
</tr>
<tr>
<td>Cefotiofur Sodium</td>
<td>Exone®</td>
<td>Exone® 4G Injectable Solution</td>
<td>No</td>
<td>GREY</td>
<td>GREEN</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>Gentject</td>
<td>Gentject 10% Injectable Solution</td>
<td>Yes 1:1</td>
<td>GREY</td>
<td>GREEN</td>
</tr>
<tr>
<td>Amikacin</td>
<td>Amikavet</td>
<td>Amikavet Injectable Solution</td>
<td>Yes 1:1</td>
<td>GREY</td>
<td>GREEN</td>
</tr>
<tr>
<td>Marbofloxacin</td>
<td>Marbocyl</td>
<td>Injectable Solution</td>
<td>Yes 1:1</td>
<td>GREY</td>
<td>GREEN</td>
</tr>
<tr>
<td>Nystatin</td>
<td>R-Nystatine</td>
<td>Oral Solution</td>
<td>Yes 1:1</td>
<td>GREY</td>
<td>GREEN</td>
</tr>
</tbody>
</table>

### Bronchodilators

<table>
<thead>
<tr>
<th>Drug</th>
<th>Trade Name</th>
<th>Drug Format</th>
<th>Dilute with 0.9% Saline</th>
<th>Standard Med Cup Colour Code *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ipratropium</td>
<td>Atrovent®</td>
<td>Atrovent® 250 UDYS Nebuliser solution</td>
<td>Yes 1:1</td>
<td>GREY</td>
</tr>
<tr>
<td>Salbutamol</td>
<td>Ventolin™</td>
<td>Ventolin™ 2.5 Nebuliser Solution</td>
<td>Yes 1:1</td>
<td>GREY</td>
</tr>
<tr>
<td>Clenbuterol</td>
<td>Ventipulmin®</td>
<td>Ventipulmin® 30 Injectable Solution</td>
<td>Yes 1:1</td>
<td>GREY</td>
</tr>
</tbody>
</table>

### Corticosteroids

<table>
<thead>
<tr>
<th>Drug</th>
<th>Trade Name</th>
<th>Drug Format</th>
<th>Dilute with 0.9% Saline</th>
<th>Standard Med Cup Colour Code *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dexamethasone</td>
<td>Dexameth</td>
<td>Dexameth 2mg/ml Injectable Solution</td>
<td>Yes 1:1</td>
<td>GREY</td>
</tr>
<tr>
<td>Fluticasone Propionate</td>
<td>Flixtide™</td>
<td>Flixtide™ 2mg/ml Nebuliser Suspension</td>
<td>Yes 1:1</td>
<td>GREY</td>
</tr>
<tr>
<td>Budesonide</td>
<td>Pulmicort®</td>
<td>Pulmicort® 0.5 Nebuliser Solution</td>
<td>Yes 1:1</td>
<td>GREY</td>
</tr>
</tbody>
</table>

### Mucolytics

<table>
<thead>
<tr>
<th>Drug</th>
<th>Trade Name</th>
<th>Drug Format</th>
<th>Dilute with 0.9% Saline</th>
<th>Standard Med Cup Colour Code *</th>
<th>Special Med Cup Colour Code For Shorter Delivery Time *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetylcysteine</td>
<td>Parvolex®</td>
<td>Parvolex® 2g Solution for infusion</td>
<td>Yes 1:1</td>
<td>GREY</td>
<td>GREEN</td>
</tr>
<tr>
<td>0.9% Saline Solution</td>
<td>B.Braun NaCl 0.9%</td>
<td>No</td>
<td>No</td>
<td>GREY</td>
<td>None</td>
</tr>
<tr>
<td>Bromhexine</td>
<td>Bisolvon</td>
<td>Oral Solution</td>
<td>Yes 1:1</td>
<td>GREY</td>
<td>None</td>
</tr>
<tr>
<td>Emser Salt</td>
<td>Emser Salt</td>
<td>Nebuliser Salt Solution</td>
<td>Yes 1:1</td>
<td>GREY</td>
<td>None</td>
</tr>
</tbody>
</table>

### Other Therapies

<table>
<thead>
<tr>
<th>Active Ingredients</th>
<th>Trade Name</th>
<th>Format</th>
<th>Dilute with 0.9% Saline</th>
<th>Standard Med Cup Colour Code *</th>
<th>Special Med Cup Colour Code For Shorter Delivery Time *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural hydro-soluble extract of curcuma longa</td>
<td>Nebulin®</td>
<td>Powder + NaCl</td>
<td>No</td>
<td>BLUE</td>
<td>None</td>
</tr>
<tr>
<td>Chelated silver and distilled water</td>
<td>Silvaplex™ &amp; EquiSilver™</td>
<td>Oral Solution</td>
<td>No</td>
<td>GREY</td>
<td>None</td>
</tr>
<tr>
<td>Thymus proteins, zinc gluconate, silver solution</td>
<td>BIOPRO-PLUS™</td>
<td>Oral Solution</td>
<td>Yes 1:1</td>
<td>GREY</td>
<td>None</td>
</tr>
<tr>
<td>Hyaluronic acid, eucalyptus essential oil in isotononic solution</td>
<td>Hyalusol®</td>
<td>Nebuliser Solution</td>
<td>No</td>
<td>GREY</td>
<td>None</td>
</tr>
<tr>
<td>Natural solutions including honey and bryonia cretica</td>
<td>Larynx/Apis</td>
<td>Oral Solution</td>
<td>Yes 1:1</td>
<td>GREY</td>
<td>None</td>
</tr>
<tr>
<td>Mixture of essential oils</td>
<td>Inha-14</td>
<td>Nebuliser Solution</td>
<td>Yes 1:1</td>
<td>GREY</td>
<td>GREEN</td>
</tr>
<tr>
<td>Grindelia, water and essential oils</td>
<td>Balsamic Air</td>
<td>Oral Solution</td>
<td>Yes 1:1</td>
<td>GREY</td>
<td>GREEN</td>
</tr>
<tr>
<td>Urtica dioica, vitis vinifera, avena sativa</td>
<td>Epistop-L</td>
<td>Nebuliser Solution</td>
<td>Yes 1:1</td>
<td>GREEN</td>
<td>None</td>
</tr>
<tr>
<td>Mixture of essential oils</td>
<td>StopBlood</td>
<td>Oral Solution</td>
<td>Yes 1:1</td>
<td>GREY</td>
<td>None</td>
</tr>
</tbody>
</table>

* Read the reverse side of this Drug Table for important information and advice on Med Cup & Drug combination choices

www.nortev.com
Features and Benefits

• Silent and robust design
• Rapid treatment
  – Standard Medication Cup Delivery of 1 ml 0.9% Saline Solution in 1 minute.
• Automatic tuning
  – Flexineb 2 automatically scans every 30 seconds, to determine the optimum operating point.
• Four hours battery life
• Portable
  – Fully Integrated system
• Easy to clean and disinfect mask
• Adaptable
  – Can be used with MDI/inhalers using the supplied adapter
• Direct delivery to the lungs
MDI compatible
First time a horse wears Flexineb

• Take your time getting the horse used to the mask

• If the horse is reluctant to put its head in then mints or a similar treat can be placed inside the mask to get the horse used to putting its head in

• It should be a fairly tight fit around the widest part of the horse’s nose

• If it is too big but not suitable for a size smaller cotton wool or a towel can be used to create a good seal

• Make sure the exit valve at the bottom of the mask is open

• Let the horse become accustomed to wearing the mask before nebulizing and first treatment something simple like saline

• Horses generally tolerate it very well but it is best to take things slow and avoid any possible bad experience
**Maintenance - Mask**

⚠️ IMPORTANT: Remove nebulizer and controller before cleaning the mask!

- **Cleaning:**
  - The Mask can be washed using clean warm tap water with some dish washing up liquid.
  - Rinse off with warm clean tap water and dry off before re-use.

- **Disinfection:**
  - First disassemble all parts of the Mask and wash them thoroughly with clean warm tap water and dish washing up liquid.
  - Rinse the parts off and let them air dry on a clean dry surface.
  - Disinfect each part by wiping down thoroughly with anti-bacterial wipes before re-assembly.

- **Approved cleaning agents (mask only!):**
  - Steri-7 - Virkon - Safe4
  - Protek Envirocair - Dettol
  - Equisupert - Accel TB
Maintenance - Med Cup

⚠ Cover the nebulizer electrical connector with the supplied protective silicone cap prior to washing. Do not immerse the nebulizer connector in water!

• Cleaning: Important to wash out the Med Cup after each use to avoid contamination or damage of the metallic vibrating mesh.
  – Open the soft blue cap and place 2-3 drops of mild dishwashing liquid into the cup and fill with distilled water.
  – Close the soft blue cap and shake vigorously for 15 seconds, at the same time squeeze the soft cap to push water through the mesh
  – Open the cap and rinse out from both sides with distilled water
  – Shake off excess water and let air dry before re-use

• Approved med cup cleaning agents:
  – Hand dishwashing up liquid
    • Fairy
    • Dawn
    • Dreft
    • Ecover
    • Henkel’s Pril
General use

- The Flexineb and its medication cup in particular should be cleaned after each use.
- The medication cup is a replacement part: its life is dependent on the drug nebulized (some are more corrosive than others) and how well it is maintained.
- A customer can expect an average of 120 uses from their medication cup.
- To maintain function of the electronic controller it must be stored in a dry place.
- To maintain function of the battery it must be charged when the assigned LED flashes green.
- Only medications from the approved chart should be nebulized and diluted accordingly.
Examining the medication cup:

- First check if the gold membrane has become corroded or rusty by holding the medication cup up to a light
  - If large holes are visible it has worn out
  - Natural wearing process - Cups with initial 10ml delivery time will naturally over time speed up to say 7/8 minutes delivery time. Still excellent aerosol but cup wearing out.

Check:
- Which drug is being nebulized (unless approved by Nortev-not covered under warranty)
- Establish whether Flexineb 1 or Flexineb 2
- Examine membrane for wear
- Examine Batch code/Date of manufacturing (this will establish how old the cup really is)
- Check all connections are in place well- connect & re-connect the med cup. Ensure no ‘Error’ lights are flashing
- Refer to Nortev’s Technical Guide p13-17 for further details
Troubleshooting - Controller

Battery Management Lighting Explained:

Power symbol:
Green solid light = On
Red solid light = Low battery
Red flashing light = Extremely low battery

Warning signal:
Amber/red flashing light = Connection Error - check all cable/med cup connections
Amber/red solid light = Internal problem – return to Nortev

Battery symbol:
Green solid light—Controller charging
No light on while plugged in to power supply = Fully charged
Warranty

24 Month:
• Mask (excluding valves)
• Aerosol Chamber (excluding inlet valve)
• Cable
• Controller (excluding battery)
• Power supply charger

6 Month:
• Battery
Any Questions?