Working our way through pup season . . .

The best way to rehydrate seals is to put them in water
(not really, see below)
Gray Seals: Cilantro NMLC 15-007 PHg
lungworms (resolved) and infected brand, *Step. phocaen* abscess (resolved), tapeworms, intestinal flukes (resolved), weight loss, eosinophilia
male [admit] wt=32 kg, SL= 114 cm; [current] wt= 32.4 BS=3/5
stranded 5/3/15 Cape Cod/ IFAW; admit: 5/4/15
last blood:6/16/15 increased WBC
last rads:5/4/12: dorsal pulmonary consolidation,-CRW
last fecal: 6/2/15; NPS {no parasites seen}
PE: Exit physical [Dr. Voorhis] WNL, no restriction on release, brand healed no lesions BS 3/5 and has gained weight over admission.
A: Since the WBC continues to be elevated we will hold Cilantro for 1-2 more weeks but release is expected in the near future.

Gray Seals: Ginger NMLC 15-011 PHg
alopecia, wounds, lungworm, tapeworms, ocular foreign body (removed)
female [admit] wt=19.7 kg, SL= 95 cm; [current] 17.5 kg BS=2/5
stranded 5/17/15 IFAW Cape Cod; admit: 5/18/15; died 6/10/15, necropsy 6/10/15

We’re sorry to report that Ginger died when her tank overfilled and she did not have access to haul-out for around 4-5 hours. After becoming exhausted Ginger drowned. A necropsy found no
live lungworms, but over a dozen *Diphyllobothrium cordatum* were received and *Corynosoma falcatum* as well.

**Harbor Seals : Dill NMLC 15-009 PPv**
abandoned pup, dehydrated resolved, spitting up continues, weight loss  
males [admit] wt=7.6 kg, SL= 84 cm; [current] =7.5 kg BS=1/5
stranded 5/13/15 COA Deer Island ME; admit: 5/15/15;  
last blood: 5/15/15; 5/19/15; 5/28/15 ACTH Stim and EP; 6/11/15  
Athens Pan-herpes PCR pending  
last rads: Barium Study 6-16-15 to 6/17-15  
T=0: Good filling of the stomach with minor air bubbles at the stomach edges, normal size and shape, residual barium in the esophagus, and immediate filling of the duodenum.  
lungs are WNL, heart WNL, decreased detail in abdomen (normal for pup) and some gas in SI A: WNL.  
T=4 hr (barium vommit and barium diarrhea): GI tract with complete intestinal filling of barium, that appears WNL, note how caudal the intestine are present (below the hips), stomach is a mix of second dose of barium and some gas and likely some material for first dose, the cardia is patent and significant barium is in the esophagus.  
A: Perhaps frequent tubing causes the cardia to remain open for episodes of regurgitation (spitting up), no obstruction, no lesions observed.  
T=24:  
Abdominal U/S 6-16-15: shaved, study viewed the heart, liver, gall bladder, stomach, both kidneys, left adrenal, and intestines, and dorsal aorta.  
No abnormalities were observed, there was no free fluid. The biliary system may have had some mild dilatation, the gall bladder was normal size and echogenicity.
PE [Williams 6-11-15]: TPR= 100.8°F, 120, 20, oral head and neck WNL no aural d/c, eyes with mucoid covering [IOP R= 13 , L=13 mmHg], mm pink and moist, vocal and active, GI palp WNL no GI noise, limbs WNL, no wounds
[Williams 6-16-15]: TPR98.4°F, 120, 20, thin, oral WNL, eyes [IOP L=24, R=27d] mucoid tear film, no eye rings, no aural d/c, BS 1/5, no blubber layer, no wounds.

Started broad spectrum antibiotic therapy, amoxicillin 30 mg/kg PO BID 10d, enrofloxicin 4 mg/kg PO BID 10d, and Denamarin for liver support 1/2 tablet PO BID 30d
The source of the infection is not known, but after 30 days and a continued failing clinical course I have opted for an antibiotic trial, likely areas of infection are the GI tract, urinary tract and lungs.

**Harbor Seals**: Basil NMLC 15-012 PPv
abandoned pup, hypoglycemia resolving, electrolyte disturbances resolving, reopened umbilicus, exposed to lice
male [admit] wt=8.1 kg, SL= 69 cm; [current] 10.1 kg BS=2/5
stranded 5/24/15 COA Deer Island ME; admit: 5/25/15;
last blood:5/26/15; 5/28/15 EP
last rads: 5/26/15
Visual Inspection [Williams] : WNL; OK for pool
OK for ivermeciton 0.2 mg/kg PO once
Harbor Seals: Rue NMLC 15-013 PPv
abandoned pup, borderline hypoglycemia (resolving), exposed to lice
male [admit] wt=7.1 kg, SL= 7.4 cm; [current] 9.0 kg BS=2/5
stranded 5/26/15 MMO M; admit: 5/27/15;
Athens Pan-herpes PCR pending
last rads: 5/28/15
HX: blood on OGT after feeding, OK to monitor
Visual Inspection [Williams]: WNL; OK for pool
OK for ivermectin 0.2 mg/kg PO once

Harbor Seals: Mace NMLC 15-014 PPv
abandoned pup, elevated GGT (50), low globulin (1.2), exposed to lice
male [admit] wt=6.4 kg, SL= 69 cm; [current] 7.8 kg BS=2/5
stranded 5/24/15 COA, ME; admit: 5/28/15;
last blood: 5/31/15
last rads: 6/2/15: chest and abdomen lateral, gas in stomach and colon, no sand, other WNL
Visual Inspection [Williams]: WNL; OK for pool
OK for ivermectin 0.2 mg/kg PO once

Harbor Seals: Juniper NMLC 15-015 PPv
abandoned pup, hyponatremia, lice
female [admit] wt=7.8 kg, SL= 80 cm; [current] 8.4 kg x cm BS=1/5
last blood: 6/4/15 (BG=116)
last rads: 6/9/15 failed
PE [admit Williams 6-9-15]: TPR=97.5, 100, 10; full term abandoned pup, EENT WNL, Nostrils clear, no aural d/c, oral WNL gums pink (teeth erupted), eyes clear, pupils constricted. Heart and lungs osculated normally, thin abdominal palpation WNL, limbs WNL, neuro/ behavior WNL.
P: Blood collected for admit CBC/SCP/ BG, ADM 0.25 cc vitamin B complex SQ
OK for tube feeding and SQ fluids.
OK for ivermectin 0.2 mg/kg PO once
P: 0.9% saline 100-200 ml SQ TID, add 1 g NaCl each feed

Harbor Seals: Sage NMLC 15-016 PPv
abandoned pup, fever, oral ulceration, hyponatremia
exposed to lice
female [admit] wt=7.1 kg, SL= 79 cm; [current] 8.1 kg x cm BS=1/5
stranded 6/7/25, Scarbough Maine MMOME; admit: 6/7/15;
last blood:6/7/15 (BG=159)
Athens Pan-herpes PCR pending
last rads: 6/9/15 failed
PE [admit Williams 6-9-15]: BAR, squirmy, TPR= 140, 16, 99.8; oral ulcers on tongue, eyes
bright and clear, pupil constricted [IOP, l=28, r=29], no aural d/c, no nasal d/c, lungs clear, heart
no murmur, mm pink and moist, limbs WNL, no body wounds or injuries, umbilicus is dry and
not inflamed and small, increased GI noise with normal GI palpation. (see cover)
OK for ivermection 0.2 mg/kg PO once
P: 0.9% saline 100-200 ml SQ TID, add 1 g NaCl each feed

Up on a SoapBox: Oral Rehydration Solutions for Seal
Many of the stranded seals and pups present to the center
with dehydration. Classical diagnosis of dehydration
involves tacky mucous membranes, poor skin elasticity,
sunken eyes, rapid heart rate, increased pack cell volume,
hypernatremia and hyperchloremia. In seals, I look for a
lack of moisture rings around the eyes and use PCV, Na,
and Cl as primary indicators. Dehydration usually
requires a slow replacement of 12-24 hours with the
classic rehydration formula:

\[ \text{BW (kg)} \times \% \text{ dehydration} = \text{fluid in L} \]

The classic rehydration fluid for parenteral use is LRS,
and can be given SQ or IV. It's important to remember
that dehydration is a progressive metabolic spiral that
ends in death, typically dehydration is the first and most
important aspect to be dealt with in a stranded animals.
Things that come before dehydration are: shock,
hemorrhage, CNS disease/seizures, and respiratory
distress.
But as you have herd me say, “if the gut works, use it” and oral rehydration is a critical aspect of
rehabilitation care and can be provided prior to a veterinary consultation. The questions are how
much and of what? Any stranded seal without “eye rings” can be assumed to be 5% dehydrated.
For the typical 8 kg pup that is a free water deficit of 400 ml [ 8 x 0.5 = 0.4 L] we’re going to
give half immediately, and the rest divided over 24 hrs. So a fluid plan could be 200 ml, at
admission and 100 ml q.4 - 8 hrs, when you add maintenance needs and other losses. Another
approach is to give 10-20 ml/kg fluid with each tubing, slowing replacing some of the volume
with formula over a course of 2-4 days. If the seal is in other wise good condition it is very
possible to do this with oral fluids. Admittedly, in the real world we often combine oral and SQ
fluids with pups to cover our bases and improve overall survival.
What you give? The seal needs water, dehydration is a free water deficit of the interstitial fluid
so we give clean water right? WRONG! Water toxicosis can also occur, and we’re all about
replacing the fluids which are going to move by a combination of active transport and diffusion, and we need to have some knowledge of these processes. In what has been called the greatest medical discovery of this century is that glucose and sodium are co-transported from the intestines into the body. This means that in order to get the sodium into the body, there must be glucose in the fluids, and as we also remember from earlier ranting “water always follows sodium”, so you move the sodium into the body and the water will enter, thus treating the dehydration. The sodium and glucose move in a one to one molar transport, so the number of sodium ions must be pared with the glucose molecules. This is why LRS and 0.9% saline are not ideal oral rehydration fluids. When these fluids are give parenterally we by-pass the gut and these fluids are distributed quickly into the interstitial and intravascular space, this is why they are matched to the tonicity and solute concentration of the serum, or at least normal serum, or close enough to allow the body to fine tune the rest. If you give too much sodium or too much sugar into the intestine this actually has an osmotic pull, once the transport mechanism is saturated uptake can not occur any faster, as the extra sugars and sodium will stay in the gut. Remember that water follows sodium, so too much salt in the gut can actually pull water out of the body. Sugar molecules are large and have a strong oncotic pull and can also draw water. Ideal oral rehydration fluids tend to be lower in sodium, and have a 1:1 ratio with glucose. I’d also be careful with using disaccharide, which is two sugars, but if for any reason this does not happen, then your not freeing the needed transport and providing an oncotic load to the gut, which we discussed is bad. Most vets are used to dehydation, with IV this is the gold standard, but any number of reasons. So rehydration protocols are handing varying degrees of therapy and hospitalization, and still impractical for seal rehabilitation of the need to have effective oral critical to our success. Many to use the human product seals.

**Pedialyte® unflavored** [Na= 45 mEq/L, K = 20 mEq/L, Cl = 35 mEq/L, zinc 7.8 mg/L, dextrose 25 g/L 100 cal.]

ingredients: water, dextrose, potassium citrate, salt, sodium citrate, citric acid, zinc gluconate about $5/L

And this is a still good place to start with seals. Under no circumstances should any artificial sweeteners be used and I consider artificial flavors suspect. Some artificial sweeteners are dangerous and toxic in animals (see xylotol in dogs) causing hypoglycemia and liver damage.

There was a little row in the marine mammal medical world blaming a veterinarian who used Pedialyte to rehydrate a dolphin who developed pancreatitis and died. There was some finger pointing that the carbohydrate load in the Pedialyte was the cause, but the more I think about this it does not make sense. I do understand that marine mammals are picievors and do not tolerate
large carbohydrate loads in the gut. But glucose is a simple sugar and should be rapidly transported out of the gut as discussed above. Also, it proteins and fats that stimulate When Pedialyte is not available or can not be afforded a home recipe has been developed:

**Human Oral Rehydration Solution for Diarrhea** [Na= 90, K=20, Cl = 80 mEq/L; Glu = 111 mmol/L]

- Sodium Chloride 3.5 grams
- Sodium Bicarbonate 2.5 grams
- Potassium Chloride 1.5 grams
- Glucose 20 grams
to be dissolved in one liter of clean drinking water

**REFERENCE:** The management of diarrhoea and use of oral rehydration therapy a Joint WHO/UNICEF statement.

We are looking into sources for dry powdered glucose. If we do end up making our own fluid, we will measure amounts in grams, not measured in teaspoons.

As we continue to learn about rehydration, here are the current fluid plans:

For SQ and IV use, the primary fluids is LRS. It’s hard to make a mistake with LRS. Normal saline (0.9% NaCl) can be used in seals that are (paradoxically) both hyponatremic (to replace sodium) and also severely hypernatremic (to slow the correction and prevent CNS swelling).

For oral fluids / electrolytes: Pedialyte or equivelent. We are looking into a modification of our oral in-house rehydration fluid and we’ll make announcements if and when we get this straightened out. I may be partial to the UNICEF formula, it’s got twice the sodium, and you only have to read back a few issues to see that this could benefit seals, and many of our stranded animals have a metabolic acidosis and so the bicarb could help too. So much to learn . . .

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