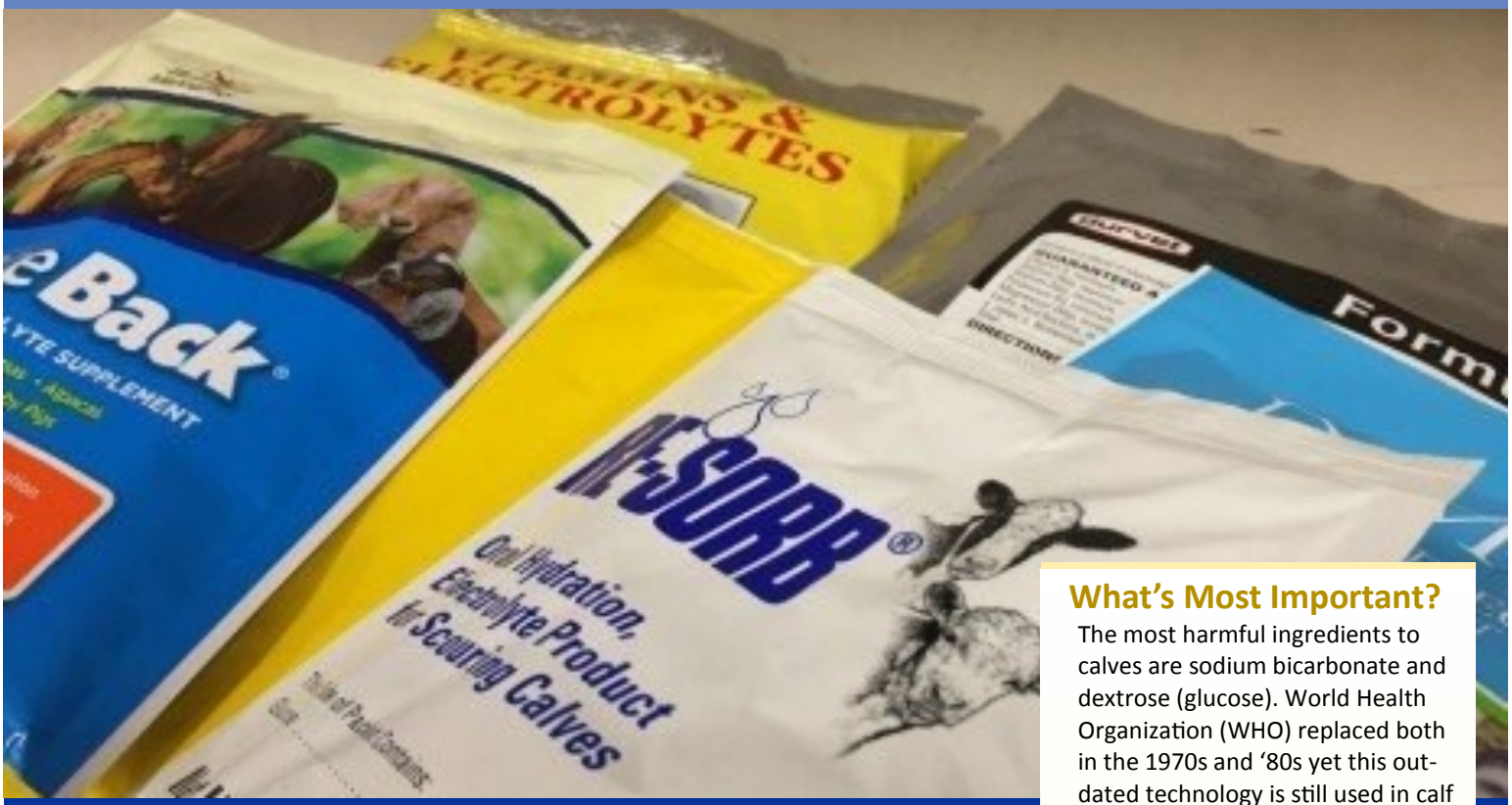
Understanding the Penn State Tables

Comparison of Commercial Electrolyte Products. How can you cut through the clutter?



With so many products, how do they compare?

Researchers at Penn State University compiled information from 30+ products which are marketed for calves with scours. They calculated nutrient levels from information listed in the Compendium of Veterinary Products, 2017 and from product labels. The minimum guaranteed concentration was used for comparisons. They noted that not every available product was included and where trade names appear, no discrimination was intended, and no endorsement by Penn State Extension was implied.

In the table, many nutrient levels show an asterisk (*) which indicates that nutrient is provided by the product, but the label contained insufficient information to calculate concentration. Some products contain another carbohydrate source in addition to dextrose (glucose) and these carbohydrates are indicated with letters where:

F = fructose, M = maltodextrin, L = lactose, S = sucrose, and A = amylose.

Every product contains sugar except ORALIVE ORS ([6]), which contains no dextrose (glucose). Instead, it contains a glucose-polymer ("polysaccharides", which is not a sugar, but a chain of many glucose molecules); value listed for glucose is glucose equivalents. ORALIVE ORS Technology is an Oral Rehydration Solution but technically is not an electrolyte.

One product ([2]) contains 63 g of lactose which is composed of glucose and galactose instead of dextrose (glucose). Other products do not specify energy source but contains reed-sedge peat and organic dried kelp without ([3]) or with ([7]) roughage products . One product contains organic sugar ([4]) but the label does not specify the form. Finally is a product which contains sucrose ([5]) instead of dextrose (glucose).

The Table was last updated Aug. 21, 2017 and was copied from the Penn State website: https://extension.psu.edu/table-comparison-of-commercial-electrolyte-products on 12/09/2019.

What's Most Important?

The most harmful ingredients to calves are sodium bicarbonate and dextrose (glucose). World Health Organization (WHO) replaced both in the 1970s and '80s yet this outdated technology is still used in calf electrolytes by many companies.

What's wrong with Bicarb?

Sodium bicarbonate allows deadly pathogens to re-infect calves as it neutralizes acid in the abomasum. Additionally, bicarb interferes with milk digestion in the abomasum since pepsin only functions within a very acid pH range. Nearly 40 years ago, sodium citrate replaced bicarb because of these problems.

What's wrong with Dextrose?

Dextrose is a simple sugar with very high osmotic pressure. Just as sugar draws juice out of strawberries to make strawberry shortcake, dextrose pulls water from the blood into the intestine when we feed electrolytes to a dehydrated calf. This "osmotic penalty" is often deadly because it reduces blood volume and kills the calf. Many electrolyte manufacturers recommend "for severely dehydrated calves, give intravenous fluids" because osmotic penalty kills calves.

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Table: Comparison of Commercial Electrolyte Products

Summary of selected nutrients in commercial oral rehydration products. Table assumes products are mixed with water according to manufacturer's directions.

Molar concentration of selected nutrients in commercially available oral rehydration products (assumes product is mixed with water according to package directions).[1]

Product	Company	Glucose mmol/L	Glycine mmol/L	Na mmol/L	Cl mmol/L	K mmol/L	Bicar-bonate mmol/L	Citrate mmol/L	Acetate mmol/L
Advance Arrest	Manna Pro (Milk Specialties)	108	0	46	*	8	*	0	0
Advance Pro-Lyte Plus	Manna Pro (Milk Specialties)	200[F]	*	104	*	23	*	*	0
Blue Ribbon	Merrick's Inc.	*[M]	*	144	*	20	0	*	0
Bluelite C	TechMix Inc.	*[F, M, L, S]	*	48	*	34	0	0	0
Bluelite Replenish[M]	TechMix Inc.	*[F, S]	*	86	*	32	0	0	*
Bounce Back	Manna Pro	167	24	144	*	23	*	0	0
Bovi-Mate[ORS]	Drench Mate	246	40	130	60	20	0	0	99
Calf Gel 95	Van Beek Natural Science	*[M]	0	39	*	7	*	*	*
Calf GoldLyte	Bio-Vet Inc.	*	*	143	93	27	*	0	0
Calf Quencher	Vedco Inc.	397	0	134	76	23	81	0	0
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Calf Restart One-4	TechMix Inc.	*[F, M, L, S]	*	*	*	128	0	0	0
Comeback	Aspen	*	*	113	*	24	0	0	0
Diaque	Boehringer Ingelheim	157	7	78	*	14	*	*	*
Electrolyte Base	Land O'Lakes	*	0	59	*	20	0	*	0
Electrolyte Complete	Land O'Lakes	*	*	115	*	20	*	*	0
Electrolytes Plus	Sav-A-Caf (Milk Products)	250[A]	30	117	*	7	*	*	0
Entrolyte HE	Zoetis	*	29	90	45	23	81	0	0

	Contains bicarb and dextrose		No bicarb - contains dextrose		**No bicarb - No dextrose**

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Epic Calf Electrolyte	Tomlyn	*	*	91	59	20	0	0	*
Formula 911	Durvet Inc. (Advantech Ltd.)	*	*	127	*	19	*	0	0
Gener-Lyte	Bio-Vet Inc.	162	*	120	93	24	*	0	*
Gener-Lyte 'G'	Bio-Vet Inc.	117	*	120	93	24	*	0	*
Hydrafeed[2]	A&L Laboratories	184	*	115	*	11	*	0	0
Hydra-Lyte	Lloyd Inc.	368	16	85	45	30	0	10	60
Multi-Electrolyte	Aspen	150	24	130	*	27	*	*	0
'O' Calf GoldLyte[3]	Bio-Vet Inc.	*	0	143	93	27	*	0	0
'O" PectiLyte[4]	Bio-Vet Inc.	*	0	111	*	19	*	0	0
One Day Response[5]	Farnam	0	*	65	39	10	*	*	0
Oralive ORS Technology[6]	**Nouriche Nutrition Ltd**	**646**	**46**	**115**	**58**	**35**	**0**	**6**	**63**
PectiLyte[7]	Bio-Vet Inc.	*	0	110	*	18	*	0	0
Re-sorb	Zoetis	129	45	80	80	17	0	0	0
Revitilyte	Vets Plus Inc.	*[A]	24	101	50	18	*	0	0
Source E	American Farm Products	394	39	241	152	38	0	*	*
SX Oral Electrolyte	EcoPlanet	*	0	*	*	*	0	0	0
Theracaf	Calf Solutions (Milk Products)	134	35	108	71	22	45	4	0

	Contains bicarb and dextrose		No bicarb - contains dextrose		**No bicarb - No dextrose**

How we color-coded the Penn State Table...

The Table from Penn State University contains a lot of information but it's more than most people can compare easily. Even technical people can get "lost in the weeds" of whether or not a product contains essential oils, reed-sedge peat, organic kelp, psyllium husk, or some other ingredients and miss the big picture. In simplest terms, the ingredients of highest inclusion, dextrose and sodium bicarbonate, have the greatest impact and are harmful to calves with scours and dehydration.

Like a traffic light, we've color-coded the table with red, yellow, and green. Products made with both bicarb and dextrose (1960s technology) are coded in red and products containing dextrose but no bicarb (1970s technology) are coded in yellow. Modern products with no bicarb and no dextrose are coded in green. For calves with severe dehydration, STOP! Do not give RED products with bicarb and dextrose. CAUTION! Do not give YELLOW products with dextrose but no bicarb! GO! Give GREEN products with no bicarb and with no dextrose that are designed for calves with severe dehydration!

WARNING! Do not give electrolytes to calves!

The calf in the photo has lost 8% of its body weight which is the threshold of severe dehydration. At this point, osmotic penalty from dextrose can kill calves. Electrolyte manufacturers know the danger and advise you not to give their products to calves in their hour of greatest need:

BlueLite C®: "*Fluid loss in excess of 8% requires IV treatment*"

SAV-A-Caf®: "*If severe dehydration occurs, intravenous therapy may be required, so consult your veterinarian.*"

RE-SORB®: "*RE-SORB should not be used in animals with severe dehydration.*"

ORALIVE® ORS *for the calves that need it most!*

ORALIVE® ORS is not an electrolyte. It is the only oral alternative to intravenous rehydration solutions like Lactated Ringer's Solution. With unique polysaccharides, we use osmosis to an advantage by pushing water from the intestine into the blood to quickly deliver fluids to calves that need it most. The ORALIVE® ORS advantage:

- No dextrose
- No bicarb
- No needles
- No antibiotics
- No waiting - fast results
- Low labor - easy delivery

Continue feeding milk replacer or milk to calves twice per day. For all calves with scours or dehydration, give ORALIVE® ORS with a nipple bottle or esophageal feeder 2-4 times per day. ORALIVE® ORS was developed specifically for severely dehydrated calves. It's fast, easy, cost-effective, and has kept millions of calves hydrated since 1996! Don't wait! Try ORALIVE® ORS today!

Nouriche Nutrition Ltd
"Solutions Through Science"

ORS TECHNOLOGY
ORALIVE
ORAL REHYDRATION SOLUTION

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