

Fluid Therapy in Small Ruminants

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Abstract

Methods for fluid therapy in adult and neonatal sheep, goats and camelids are presented, as well as catheters and key formulas. Fluid therapy regimes for common clinical situations, such as diarrhea and sepsis, are provided.

Résumé

Des méthodes de fluidothérapie chez les ovins, les caprins et les camélidés nouveau-nés et adultes sont présentées, de même que les cathéters et les principales formules en usage. Des préparations de fluidothérapie pour parer à des situations cliniques courantes comme la diarrhée et la sepsie sont proposés.

Introduction

Timely administration of fluids can improve the outcome of many diseases and is sometimes the difference between recovery and death. The main indications for fluid therapy are shock, dehydration and electrolyte abnormalities. Sheep and goats are usually predictable when it comes to electrolyte abnormalities, so bloodwork is rarely necessary before instituting fluid therapy for most conditions. Camelids, however, are less predictable, and practitioners are urged to use clinicopathological data to guide fluid therapy decisions. The following information is provided in outline form for use as a quick reference for small ruminant fluid therapy.

Basics

Catheters:

Adult sheep/goats/llamas/alpacas and crias: 16 G 3.25" in jugular

Kids/lambs: 18G 2" in jugular

Intraosseous in neonates if can't get catheter in
Always make a stab incision completely through skin with #15 blade, which will save time and catheters.

Dehydration deficit:

$BW(kg) \times \% \text{ dehydration} = \text{deficit in liters (careful with small ruminants)}$

Example, an 88 lb (40 kg) goat that 8% dehydrated needs
 $88 \div 2.2 = 40 \times 0.08 = 3.2 \text{ L}$

Maintenance:

1 mL/lb/hr (2 mL/kg/hr)

Bicarb deficit:

Neonate: $BW(kg) \times \text{base deficit} \times 0.6 = \text{mEq bicarb}$

Adult: $BW(kg) \times \text{base deficit} \times 0.3 = \text{mEq bicarb}$

Can substitute (normal bicarb - measured bicarb) for bicarb deficit (BD)

$\text{mEq bicarb}/12 = \text{grams bicarb}$

Lambs and Kids

Following dystocia:

May look normal initially, but crash 2-4 hours later, be aggressive with therapy

If depressed: Measure bicarb and correct deficit or use BD of 10

Consider SoluDelta-Cortef (1 mg/lb; 2.2 mg/kg)

Consider oxygen even if no respiratory difficulty and normal color

Dehydrated non-diarrheic (septic, hasn't nursed, etc.):

May be hypoglycemic

If < 8 % dehydrated, mild depression, still walking:

150-250 mL oral calf electrolytes **without** bicarb

If > 8% dehydrated, depressed, recumbent:

Correct fluid deficit with balanced electrolyte solution
Add: 20 mEq KCl/L and 20-40 mL 50% dextrose/L (will = 1-2% dextrose in solution)

OR

2 mL/lb (4 mL/kg) hypertonic saline solution (administer over 5 min) followed by oral calf electrolytes **without** bicarb

-if no response consider acidosis and treat like dystocia above

-may need more glucose if severe hypoglycemia

-follow up with milk

Diarrhea:

Dehydrated, acidotic, hyperkalemic, whole body depleted in K^+ (not usually hypoglycemic)

For deficit:

If < 8 % dehydrated, mild depression, still walking:
150-250 mL calf electrolytes without bicarb (if available; if not, use with bicarb)

If > 8% dehydrated, depressed, recumbent:
bicarb: calculate bicarb needs if bloodwork available or use BD of 10
8.4% bicarb = 1 mEq/mL
fluid: make up fluid deficit with balanced electrolyte solution
add: 20 mEq KCl/L and 20-40 mL 50% dextrose/L (will = 1-2% dextrose in solution)
give half first hour then other half over 2 hours

OR

2 mL/lb (4 mL/kg) hypertonic saline solution (administer over 5 min) followed by oral calf electrolytes **with** bicarb
(do not use HSS if suspect mixing error of oral electrolytes administered by owner)

-follow up with oral calf electrolytes without bicarb (if available; if not, use with bicarb) per day as long as severe diarrhea continues

-leave on milk or milk/milk replacer unless chronic diarrhea and use of total parenteral nutrition (TPN)

-always mix electrolytes according to directions with water, not milk

-always refrigerate unused calf electrolytes and discard after 3 days

Adults

Usually alkalotic, mild hypokalemia, mild hypocalcemia

If < 8 % dehydrated, mild depression, still walking:
correct deficit with oral fluids unless rumen disease or GI obstruction
can add KCL and calcium gel to oral fluids

If > 8% dehydrated, depressed, recumbent:
IV isotonic fluids with 20 mEq KCl/L and calcium solution at 25-50 mL/L

OR

-2 mL/lb (4 mL/kg) hypertonic saline solution (~ 2 L per adult cow)—administer as fast as possible through 14 G catheter

-follow with oral fluids (will usually drink following HSS) if no GI disease or IV if GI disease

If grain overload:

-calculate bicarb deficit if bloodwork available or use BD of 10 and administer IV

-follow up with IV fluids (do not give large amounts of oral fluids, already have rumen distension)

-can give some bicarb orally but probably no use if severe (need rumenotomy)

-DO NOT USE hypertonic saline solution (may be already hyperosmolar)

Llamas/Alpacas:

-unpredictable electrolyte and acid/base status, so always run bloodwork, esp. in crias

-adults commonly get fatty liver when off feed so consider partial parenteral nutrition (PPN) if anorexic for more than a few days

-camelids get hypoproteinemic easily

TPN/PPN

-use formula in back of Smith's *Large Animal Internal Medicine*

-for neonates use TPN

-for adults use PPN since fatty liver is a concern if negative energy balance (just leave out lipids in formula)

-start at 1/4 target rate (in Smith under formula), if glucose 150- 200 in six hours leave at current rate, if > 200, slow rate slightly, if < 150, increase rate by another 1/4 (these are basic rules, try not to change rate drastically and give time for insulin to increase)

-keep increasing until get to target rate (I have never gotten to target rate, but always see benefits even at low rate)

-monitor glucose/PCV/TP q 6 hours, electrolytes/acid/base status daily (watch out for hypokalemia)

-wean off slowly

-MUST BE administered with fluid pump

OR

-for adults

-5L Normosol + 500 mL 50% Dextrose + 1 L Aminosyn + K and Ca as needed + 20 mL B vitamins at rate of 5% body weight per day

Insulin is recommended in **camelids** with TPN or above fluid regimen (0.4 u/kg ultralente SQ q24hrs). Stop insulin 24 hours before stopping fluids.

Tips

-If on continuous fluids consider bolusing q 3 hours. (have better control of rate in animals with long necks and thick skin that cause kinking of catheters)

NOT appropriate if glucose content is > 2% or for PPN/TPN

-1 level teaspoon is approximately 5 grams of most salts

-NaHCO₃: 1 gm = 12 mEq so 240 mEq = 20 grams or ~ 4 tsp.

- Isotonic saline: 9gms/L non-iodized table salt,
~ 2 tsp NaCl/L water is isotonic saline
- Supplement potassium:10-20mEq/L or 1gm/L(14mEq/L)
- ~ half a tsp. lite salt/L water (lite salt is half NaCL and half KCL).

**PRODUCT
INFORMATION**

NADA #141-063, Approved by FDA.

**Nuflor®
(FLORFENICOL)**

**Injectable Solution
300 mg/mL**

**For Intramuscular and
Subcutaneous Use in Cattle Only.**

BRIEF SUMMARY (For full Prescribing Information, see package insert.)

INDICATIONS NUFLOL Injectable Solution is indicated for treatment of bovine respiratory disease (BRD), associated with *Mannheimia haemolytica*, *Pasteurella multocida*, and *Histophilus somni* (*Haemophilus somnus*), and for the treatment of bovine interdigital phlegmon (foot rot, acute interdigital necrobacillosis, infectious pododermatitis) associated with *Fusobacterium necrophorum* and *Bacteroides melaninogenicus*. Also, it is indicated for the control of respiratory disease in cattle at high risk of developing BRD associated with *Mannheimia haemolytica*, *Pasteurella multocida*, and *Histophilus somni* (*Haemophilus somnus*).

RESIDUE WARNINGS: Animals intended for human consumption must not be slaughtered within 28 days of the last intramuscular treatment. Animals intended for human consumption must not be slaughtered within 38 days of subcutaneous treatment. Do not use in female dairy cattle 20 months of age or older. Use of florfenicol in this class of cattle may cause milk residues. A withdrawal period has not been established in pre-ruminating calves. Do not use in calves to be processed for veal.

WARNINGS: NOT FOR HUMAN USE. KEEP OUT OF REACH OF CHILDREN. This product contains materials that can be irritating to skin and eyes. Avoid direct contact with skin, eyes, and clothing. In case of accidental eye exposure, flush with water for 15 minutes. In case of accidental skin exposure, wash with soap and water. Remove contaminated clothing. Consult a physician if irritation persists. Accidental injection of this product may cause local irritation. Consult a physician immediately. The Material Safety Data Sheet (MSDS) contains more detailed occupational safety information.

For customer service, adverse effects reporting, and/or a copy of the MSDS, call 1-800-211-3573.

CAUTION Not for use in cattle of breeding age. The effects of florfenicol on bovine reproductive performance, pregnancy, and lactation have not been determined. Intramuscular injection may result in local tissue reaction which persists beyond 28 days. This may result in trim loss of edible tissue at slaughter. Tissue reaction at injection sites other than the neck is likely to be more severe.

ADVERSE EFFECTS Inappetence, decreased water consumption, or diarrhea may occur transiently following treatment.

Made in Germany

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Fast.²**

**Nuflor Antibiotic Begins Killing
BRD Bacteria in 30 Minutes**

The FDA has verified NUFLOR antibiotic's power to kill *Mannheimia haemolytica* and *Histophilus somni* — two of the bacteria that cause BRD. NUFLOR antibiotic begins killing within 30 minutes and eliminates 99.9% of the bacteria in 24 hours.

For long-lasting treatment, NUFLOR antibiotic also inhibits *Pasteurella multocida* for a total of four days.

Take control of BRD fast and keep it under control with NUFLOR antibiotic.

**See your animal health supplier or
Schering-Plough Animal Health representative
for NUFLOR antibiotic.**



**Nuflor[®]
(FLORFENICOL)**

*The One Cattlemen
Count On*



Do not use in female dairy cattle 20 months of age or older, as use in lactating dairy cattle may cause milk residues. Not for use in cattle of breeding age. Do not use for calves to be processed for veal. Full product information found on page 179.



¹ Exhibits bactericidal activity against some strains of *Mannheimia haemolytica* and *Histophilus somni*.

² Testing demonstrated that 99.9% of the bacteria were killed within 24 hours. Data on file at Schering-Plough Animal Health Corporation.

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