

PMT Calf Care Manual

REPLACEMENT AND DAIRY BEEF CALF REARING TIPS

START WITH HEALTHY DRY COWS

- Pay particular attention to energy, phosphorus, vitamin A , vitamin E, copper and selenium nutrition
- Develop an appropriate vaccination program with your local veterinarian (IBR, BVD, PI₃, etc.)
- Immunoglobulins accumulate in the udder during the dry period (late lactation) at the rate of about 0.1% per day. Therefore strive for a 60 day dry period and 6% immunoglobulins (60 g/litre) in colostrum.

PAY CLOSE ATTENTION TO THE CALVING SITE

- Calve cows in a frequently cleaned and disinfected stall that is adequately bedded, sheltered from extreme weather, with considerable ventilation (but which is not too drafty) and large enough so the cow can move around freely without trampling the calf.
- This site should be separated from contact with older calves and other cows (to minimize pathogen transfer to the newborn calf).

BARN ENVIRONMENT – MATERNITY PENS

- The maternity area should be in a quiet part of the barn yet should be easily visible for frequent observation by the herd manager and other dairy personnel. A maternity pen should be a minimum of 3 m x 3 m (10'x10'), and must be clean,

dry, draft-free, and well lighted, insulated and ventilated. This will help with disease control, comfort and provide stable footing for both the dam and newborn calf.

- Calving assistance should be provided when necessary. Positioning of a vacuum line and stopcock in each pen or nearby to facilitate milking the fresh cow to obtain colostrum would be ideal.
- A supply or utility room should be near the calving area to provide for safe and convenient storage of calving equipment and refrigeration of health care products and colostrum. A sink and running hot and cold water for cleaning equipment and utensils are also recommended in a well-planned calving facility.
- Prior to calving, remove soiled straw and visible manure from the pen and add fresh bedding. First add a 15 cm (6") layer of dry sand. If you are using shavings or chopped straw, the bedding should be 5-8 cm (2-3") deep. If you are using long straw, the bedding should be 10-15 cm (4-6") deep. Superior sanitary conditions will minimize potential disease transfer and stress to both the cow and newborn calf. By reducing pathogenic bacteria in the calving area, you are providing the calf the best possible start in life.
- For cows that need help in the maternity pen during calving, the pen should be equipped with a locking stanchion. The bottom of the stanchion should be close to the ground to prevent a cow going down and chocking herself. The cow should be clean and the udder should be clipped and manure-free. Within a half hour of birth, the calf should be removed from the cow's environment to a newly sanitized area (where no cow has been recently) to reduce the calf's exposure to pathogenic bacteria, viruses and protozoans (e.g. *Cryptosporidia*).

BARN ENVIRONMENT – CALF PENS

- Comfort is important to raising healthy calves. In the first week of life, calves spend 80% of the day lying down. This down time decreases to 75% by week 2. The cleanliness of their bedding environment is therefore of the utmost importance to their health and wellbeing. Newborn calves have very little body fat, and cannot effectively regulate their body temperature. Their comfort (thermoneutral) zone is between 10°C – 25°C (50°F - 78°F). Therefore, they need to be able to “nest” or burrow into their bedding to keep dry and warm when ambient temperatures dip below 10°C. The straw should be deep enough to cover their legs. Calves in a comfortable environment can more effectively utilize

the nutrients in their diet for growth, rather than utilizing them to maintain body temperature (shivering thermogenesis brought on by environmental stress).

Bedding – A general rule of thumb on replacing or adding to bedding – if you kneel on the bedding and your knees become wet within 20 seconds, then the bedding is too wet and should be changed or added to.

- A heated building with a sound, mechanical ventilation system is a warm calf environment. The temperature in a warm calf house should be 10°C (50° F) with less than 80% relative humidity.
- Keeping calf housing clean has to be one of the biggest priorities for effective calf rearing operations. Young calves still have undeveloped immune systems; should they become wet and dirty, it may increase their susceptibility to disease challenges. Soiled bedding needs to be removed and replaced with clean, dry bedding material. Once calves are weaned and moved into the heifer rearing area, the calf rearing area or individual hutches need to be cleaned out, disinfected and rebedded.
- Make sure the calf rearing facility has good ventilation, but avoid drafty conditions. Properly ventilated barns allow for good air movement either naturally by providing sufficient windows, doors and vents (as in calf hutches) or artificially by the use of fans, heat exchangers, and the like. The actual needs for a given housing system will depend on the season, ambient temperature, humidity, the number of calves housed and the stocking density, the volume of air, etc.

A "rule of thumb" test to use is this: if you can smell ammonia on your clothes after leaving a calf barn, it's likely that the ventilation in the barn is inadequate.

- Good ventilation aids in reducing the concentration of potentially harmful gases (e.g. ammonia); these gases can directly harm the calf or increase stress and reduce the animal's immunity and its response to disease challenges. This is especially important for calves housed indoors. For calves housed outdoors in individual hutches, a shelter free from drafts should be provided. Proper ventilation is essential to reduce the transmission of airborne pathogens from calf to calf. Calf hutch ventilation can be improved by elevating the rear of the hutch using a section of 2" x 4" lumber.
- Good drainage in the bedding area is of vital importance in helping to keep young calves dry. This applies to calves housed in barns, but it is of particular importance for calves housed in hutches. If you use hutches, they should be placed on top of sand or gravel to provide good drainage under the bedding.

Wherever possible, placing the hutches on natural slopes will help runoff to drain away from the hutch.

INDIVIDUAL PENS VS. GROUP HOUSING

- **Individual pens or hutches** – Calf to calf contact can spread disease quickly.
 - Each calf needs about 1.2 m x 2.4 m (3.9 ft. x 7.8 ft.) of her own space to thrive.
 - This concept assumes that calves cannot come into physical contact with another animal. This is important. Calves are born with undeveloped immune systems. They are especially at risk if they do not consume sufficient colostrum. Many of the diseases young calves experience are caused by enteric pathogens that infect the calf either by fecal-to-oral or animal-to-animal contact.
 - Naturally, if calves have direct contact with other calves (or adult animals), the risk of transmission is greatly increased. (This also points out the need for calf caretakers to be diligent in their own personal cleanliness when dealing with calves!).
 - By isolating calves (particularly prior to weaning), we can markedly reduce the risk of disease transmission. Much of the success of calf hutches in reducing disease and death loss is related to this concept.
- **Communal pens or Group Housing Systems** – Convenient to manage.
 - Calves need to be ear-tagged for ease of identification, particularly if there is a disease challenge.
 - This is the system of choice with automated calf feeders (e.g. *Urban™ U40*) and mob feeders. Management is simplified, but requires increased care in disease detection.
 - Automated systems can be tailored and monitored for individual calf intakes; reduction in intake for an individual calf may be the first indication of a disease challenge or compromised immune system.

- Calves should have ready access to feed and water without having to travel great distances. Calf starter and water should be readily available.

REARING CALVES IN SEVERE COLD CONDITIONS

- In the severe cold conditions, below 10°C (50°F) special management is required. Be sure to provide ice-free water at all times. Keep a close eye on the amount of bedding and its moisture level (cold, wet calves lose a lot of body heat and may succumb to poor environmental conditions).
- Increase the depth of the bedding and eliminate drafts, while providing good ventilation.
- Feed additional feed (milk, milk replacer – up to 33% more; and starter ration) to provide the additional energy calves need for heat production.

THE NEWBORN CALF – BIRTH TO DAY 3

NOTE: All dairy calves in Canada MUST be ear tagged with radio frequency identification (RFID) at birth. If using a single tag use the right ear. This ensures traceability and compliance with government regulations. Ear tags also help identify calves in automated feeding systems.

- Clean the calf's nostrils and mouth if possible; this frees up the airways of any prenatal fluids, and allows the calf to breathe better.
- Disinfect the navel area (e.g. Tincture of Iodine) by dipping and spraying, and then massage it into the area. This will decrease the number of calves with swollen joints and lameness.
- Allow the cow to lick her calf; (there is some passive transfer/inoculation of microbes from dam to calf through ingestion of dam's saliva by the calf). If the dam refuses, then rub the calf all over using a towel, burlap bag or dry straw. This action also stimulates blood circulation and peristaltic movements of the intestines, which in turn will help eliminate prenatal intestinal contents.

- **Feed COLOSTRUM ASAP!** Allow calf to suckle naturally if possible. If the calf is not ingesting the recommended amounts of colostrum, then stomach tubing may be required. (See over for *Colostrum Management*).
 - Feed the best quality colostrum that is available. This typically comes from cows with the following characteristics:
 - Are in their 2nd lactation or higher
 - Have had at least a 60 day dry period
 - Have a Condition Score greater than 3.5 out of 5
 - Calve in the warmer months of the year
- If calves are purchased from unknown origin or the quality and quantity of the colostrum that the calves have received is unknown, then some vitamin and trace mineral injections are suggested upon arrival:
 - Vitamin A 200,000 – 500,000 IU
 - Vitamin D₃ 25,000 – 75,000 IU
 - Vitamin E 100 – 300 IU
 - Selenium 3 – 6 mg
 - Iron 100 mg (from iron dextran)

These supplemental injections may boost immunity, reduce incidence of scours or white muscle disease and prevent anemia.

COLOSTRUM MANAGEMENT*

1. Collecting Colostrum

- Wash hands before collecting colostrum
- Cleanly collect colostrum from the cow. Make sure to clean the dam's teats and teat ends using appropriate disinfecting methods (used for collecting milk).
- If using a bucket milker, make sure that the bucket and all hoses have been properly disinfected to minimize/prevent bacterial transfer to the teat canal.
- Collect colostrum from dam within 15 minutes of calving.

2. Pooling Colostrum

- Pooling is not recommended as there is the potential for disease transfer (from infected dams in the herd).

3. Storing Colostrum

- Fresh colostrum can be refrigerated without degrading the proteins for up to seven (7) days.
- DO NOT LEAVE COLOSTRUM AT ROOM TEMPERATURE! Bacterial populations double every 20 minutes in colostrum.
- Refrigerate at 1.0°C to 2.0°C
- Colostrum may also be FROZEN.
- It is recommended that it be stored in 2 litre double-bagged freezer bags. Label bags with the date and the dam (from whom the colostrum was taken).
- Freezer temperature should be -20°C
- Frozen colostrum may be stored for up to one (1) year.

4. Thawing Colostrum

- Frozen colostrum should be thawed in a warm water bath (50°C/120°F).
- Do not thaw at room temperature (20°C-22°C)
- Microwaving on low for short periods is acceptable for thawing colostrum, but watch closely and avoid hotspots.

5. Feeding Colostrum

- If colostrum is of good quality, free from blood, serum, mastitis, feed 4 litres to the calf within 30 minutes of birth.
- *NOTE: If colostrum is of poor quality, use good quality colostrum (ideally from cows in the same herd) that has been frozen or a good quality colostrum replacement product.*
- Calves should receive an additional 2 litres within 8 hours of birth.
- Stomach tubing may be required if the calf refuses to suckle the dam or drink from the bottle.
- Thereafter, feed 8-9% of the calf's bodyweight (BW) during the next 2-3 days split into at least 2 equal feedings per day.

NOTE: Bigger breeds (such as Holsteins) need at least 4 litres of colostrum as soon as possible after birth. Smaller breeds (such as Jerseys) will need at least 3 litres.

- Continue feeding transition milk for up to three (3) days as it is very rich in nutrients and the calf continues to have a heightened ability to absorb large particle nutrients across its gut wall.
- Feeding excess colostrum can cause scouring.

NOTE: Feed the best quality colostrum that is available. This typically comes from cows with the following characteristics:

1. Are in their 2nd lactation or higher
2. Have had at least a 60 day dry period
3. Have a Condition Score greater than 3.5 out of 5
4. Calve in the warmer months of the year.

6. Colostrum Quality

- Colostrum should have the look and consistency of melted vanilla ice cream. It will be noticeably creamier than regular milk. Runny, thin colostrum or colostrum mixed with blood are signs of poor colostrum quality.
- To test for colostrum quality, use a good **colostrometer**.
- Colostrometers measure the specific gravity of colostrum and provides an estimate of the immunoglobulins (IgG) levels present in colostrum.

NOTE: Calves that have their blood tested and have a total protein concentration greater than 5.5 grams/dL have received adequate colostrum.

- Testing of the calf can occur from six (6) hours after the first colostrum feeding up to seven (7) days of age. Consult with veterinarian, and request a random blood test, which will be good feedback on the effectiveness of colostrum management.
- Colostrum samples collected on farm can be sent to a qualified laboratory for testing. Bacteria counts should be less than 100,000 colony forming units (CFU)/ml.
- High bacteria counts are associated with poor colostrum absorption in the calf.
- Note also that poorly managed colostrum can also become a source of infection to the neonatal calf.

7. Proper Hygiene is Key

- All mixing and feeding utensils (e.g. whisks, bottles, buckets and nipples) should be washed using either soap or detergent and hot water (80°C/170°F).
- The feeding utensils should then be rinsed with a good disinfectant such as EfferSan™ solution with *Activon*™ technology. (The active ingredient in EfferSan™ is *sodium dichloro-s-triazinetrione*). A 10% bleach solution can also be used.



- After washing, let the utensils dry before the next use to reduce bacterial load.
- Bottles and buckets with cuts, grooves and scratches on their inside should be discarded as these sites can harbor bacterial slime, not easily removed through the washing process.
- REPLACE PLASTIC BOTTLES ANNUALLY! REPLACE NIPPLES AFTER EACH WEANING OR AS NEEDED!
- Producers using automated milk feeding systems such as the *Urban™ U40*, should follow the manufacturer’s recommended cleaning and disinfecting regimens, using their disinfectants.

8. Common misconceptions regarding the use of Colostrum

- A common misconception is that calves should receive colostrum from their own dam or herd to be protected against pathogens present on their farm.
- Certain natural, dried colostrum replacers do in fact provide protection from disease worldwide, and should be considered if fresh colostrum options are limited. A firm plan should be in place prior to calving, since the first feeding colostrum must take place right after birth.
- Remember, if a cow has never been exposed to a given calf pathogen prior to giving birth, she will not have developed antibodies against that pathogen; therefore she will not be able to secrete an effective antibody into her colostrum. So that colostrum may not be a good defense against that calf pathogen.
- The most common causes of calf disease and mortality during the first three (3) weeks of life are pneumonias and diarrheas caused by pathogens capable of infecting the respiratory and intestinal tracts (outlined below).
- These pathogens are worldwide in distribution and antibodies against them have broad cross-protection application in different regions and countries.
- Commercially available colostrum replacers – which are collected from thousands of dairy cows – may thus be an effective alternative to fresh colostrum, and should be carefully considered.

9. Common pathogens that cause disease in Dairy Calves

- Typically, on-farm disease challenges manifest themselves broadly into two disease syndromes – Diarrheas and Pneumonias. The primary causative agents are listed below:

Diarrheas

E. coli (K99, F41)

Coronavirus

Pneumonias

BHV-1 (IBR)

BVDV

<i>Rotavirus</i>	PI3
<i>C. perfringens</i>	BRSV
<i>Cryptosporidium</i>	<i>Mannheimia (Pasteurella) haemolytica</i>
<i>Coccidia</i>	<i>Pasteurella multocida</i>
<i>Salmonella</i>	<i>Histophilus (Haemophilus) somnus</i>
	<i>Mycoplasma bovis</i>

DAY 4 TO WEANING

There are two (2) choices when feeding the pre-weaned calf:

1. Whole Milk (supplemented with *THRIVE! Milk Supplement* fed at 25 grams/head/day)

Or

2. Wet Nurse™ Milk replacer *containing EL4L technology***

Thrive!
milk supplement

WET NURSE™
MILK REPLACER

ESSENTIAL
Lipids **4** Life

NOTE: The National Farm Animal Care Council (NFACC), through their Dairy Code of Practice*, recommends feeding calves at a minimum of 20% BW of whole milk (or equivalent nutrient delivery via milk replacer) until 28 days of age (e.g. approximately eight (8) litres per day for Holstein calves).**

- Put the calf on whole milk (supplemented with *Thrive! milk supplement*) or a high quality Wet Nurse™ calf milk replacer (*containing EL4L*) by four (4) days of age. High fat milk replacers (16% – 20%) and those containing EL4L, tend to produce better feed conversions, greater frame size, improved weight gains and improved scour scores under stressful situations, particularly cold, damp environments.
- Increase milk intake when the environmental temperature drops below 10°C (increase all fluid diets by 25% in winter months).

- When feeding milk replacer, be sure that the calf's neck is extended (this helps to close the esophageal groove). Do not feed at ground level as this may allow spillage from the esophageal groove into the reticulo/rumen instead of channeling milk into the abomasums (true stomach).
- The recommended feeding temperature of milk replacer is 38°C. Feeding too hot or too cold can alter nerve endings and normal gut motility and lead to possible bloating.

**For further discussion on Colostrum Management, visit www.calfcare.ca*

***EL4L Technology helps increase ADG; improve frame size and feed conversion, while reducing scours*

**** All available Codes of Practices are available at www.nfacc.ca*

- Provide fresh, clean water and high quality, palatable calf starter from 4 days of age on a continuous free choice basis. The top of drinking cups and pails should be around 50 cm (20") from the floor. The water troughs and feed bunks should be separated from each other. (A pail or container similar to that used for feeding milk replacer is suggested for the calf starter until calves are 1 week past weaning). Allow 61 cm (24") per calf at the feed bunk and design it to be easily and efficiently cleaned.
- Calf starters generally come in two (2) types:
 - Stand alone – designed to be fed without hay
 - Traditional – designed to be fed with hay

NOTE: Calf starters are available with EL4L fatty acid technology, allowing you to extend its four (4) key benefits – improved feed efficiency; increased average daily gain (ADG); improved frame size and reduction of scours – through the weaning phase and beyond. Consult your local feed manufacturers for more details of their EL4L-products which will meet your needs.

- Continue feeding milk replacer until a calf is consuming a minimum of 0.75 kg (1.65 lbs) of dry calf starter per day. For Holstein calves, this usually occurs between 4-6 weeks of age, depending on palatability of starter ingredients and levels of feeding of milk replacer or whole milk. At 4-6 weeks of age one of the strongest stimuli to increase dry starter feed consumption is to decrease the amount of milk replacer or milk offered.

- Calves should be checked on a regular basis for the first signs of a disease challenge – particularly if they are group housed (on a calf feeding machine). Regular rectal temperature checks should be a standard step of good management practices; elevated temperature (above 38°C) would indicate possible disease challenge. Consult the veterinarian should a disease challenge occur. A better pre-emptive step would be to consult the veterinarian to design a pneumonia prevention and treatment program.
- Remember to incorporate a de-worming/coccidiosis control program. De-worming calves destined for dairy beef has been suggested as young as 30 days.

BEYOND WEANING

- Consult the local feed manufacturers for their recommendations on:
 - Dairy Beef Starters and Supplements.
 - Replacement Heifer Starters, Developers and Supplements
- Good quality hay is suggested until at least 3 months of age but preferably up to 6 months of age.
- Silages are NOT recommended until AFTER 3 months of age, as they may limit dry matter intakes and gains.
- DO NOT feed urea compounds prior to 3 months of age.
- Dehorn calves before 3 months of age and have extra teats on replacement heifers surgically removed.
- Consult the local veterinarian to design a complete vaccination program which may start at 3-4 months of age.
- Consult the *National Farm Animal Care Council (NFACC)*, through their *Dairy Code of Practice*, for a more complete discussion on space requirements for group-housed calves and heifers at www.nfacc.ca
- In general, for group pen housing allow a minimum of 2.3-2.8 m² (25-30 ft²) per calf, with a maximum of 7-10 calves per pen and a maximum age difference in any one group of 2-3 months.

UNDERSTANDING SCOURS

DESCRIPTIONS AND CAUSES OF SCOURS

Calf Scours (or diarrhea) is a descriptive diagnosis of a disease which has many causes. The causes are divided into mechanical, nutritional or infectious. Infectious scours is by far the most common scours problem in calves.

1. **Mechanical Scours**: This type of scours is due to excessive amounts of milk being fed (and consumed) in a short time. Continued over-feeding may not only result in scours, but it may also lead to *enterotoxemia*, caused by *Clostridium perfringens* types C & D. Mechanical Scours is usually corrected by reducing the solution concentration of milk replacer powder being fed; while keeping the volume of water constant.
2. **Nutritional Scours**: is due to deficiencies in the calf diet due to lack of sufficient colostrum absorption. This is generally accompanied by Infectious Scours. The nutrient most commonly deficient is vitamin A. Vitamin A cannot be transferred across the placenta, even though the dam may be consuming more than adequate levels during gestation. Vitamin A can be absorbed across the calf's gut post partum. Vitamin A deficiencies occur when the calf's dam has not received adequate levels of this vitamin to permit normal vitamin A level in the colostrum.
3. **Infectious Scours**: *Escherichia coli* (coliform) bacteria are the principle cause of infectious scours in calves. The severity of outbreaks due to *E. coli* depends on the type of coliform bacteria involved, the exposure rate, the quantity and quality of colostrum received by the calf and other environmental stress factors.

E. coli usually causes a severe diarrhea wherein the calf rapidly becomes weak and dehydrated and is usually feverish early on in the course of the disease. *E. coli* organisms invade the bloodstream of the calf and cause a generalized infection. Colostrum-deprived calves usually die from this form of disease. It can be so acute that there frequently is no evidence of diarrhea; so your best detection is close observation of the calves and taking rectal temperatures the moment a calf begins to look listless and stressed.

Bacteria of the *salmonella* group also cause calf scours. A scour outbreak due to this bacterium is generally associated with calves which have gone

through a public sales facility. When outbreaks occur, the mortality is generally high.

Clostridium bacteria can also cause infectious calf scours, but the incidence of this infection is low compared to *coliform* infections.

PREVENTION

Effective management is primarily responsible for prevention of scours. Calf scour problems usually are the most severe during the winter and early spring. This is due to a proliferation of infectious organisms (Bacteria, viruses and parasites) in the buildings housing calves. The problem will not usually be ameliorated until the barns can be opened up and depopulated. Clean, dry bedding, over a deep sand base, and good cleanup between calves are essential.

PMT has several nutritional and management options to help you combat scours.

- PMT recommends feeding a Wet Nurse™ calf milk replacer with EL4L technology or Thrive! Milk Supplement with EL4L technology. EL4L lipid technology helps to strengthen the calf's immune system and has been proven to significantly reduce scours caused by *Rotavirus* and *Cryptosporidia*.
- PMT distributes *EfferSan*™ with *Activon*™ technology disinfectant in tablet form. EfferSan is a dried form of *sodium dichloro-s-triazinetrione*, and when reconstituted with water, has been shown to effectively reduce pathogenic organisms in barn environments.

KEY MANAGEMENT TIPS

Keep young calves away from older heifers and cows. Calves up to 30 days of age do not yet have fully functional immune systems. Many older animals can act as reservoirs for pathogens, so housing them adjacent to young calves can severely compromise their growth potential due to low level disease challenges

NOTE: Take the calf's temperature at the first sign of sickness (such as droopy ears, glassy eyes, not eating, etc.). Normal rectal temperature is 38.6°C (101.6°F). Research has shown that taking a calf's temperature will indicate sickness before other visual signs manifest themselves.

OTHER CAUSES OF SCOURS

1. Reovirus sp.
2. Adenovirus sp.
3. Coronavirus sp.
4. Enterotoxemia due to Clostridia perfringens type C (Otherwise known as Hemorrhagic Enterotoxemia or the Overeating Disease).

SCOURS TREATMENT DEPENDS ON TYPE AND SEVERITY

If the scours is determined to be a nutritional form of scours (e.g. the calf is not off feed; it is not depressed, and shows no elevation of temperature), consider maintaining the amount of milk or milk replacer solution being fed, but reduce the concentration by 25-50% by further dilution with water, for 1-2 days.

NOTE: In cold environments, caution is advised as a scouring calf still needs adequate energy. Our general recommendation has been to consider increasing overall intake by up to 33% when ambient temperature falls past 4°C. This can be achieved by adding a third feeding to twice per day feeding regimens. When faced with a scours challenge, consider splitting overall intake into 4-6 feedings per day.

When faced with **Infectious scours** administration of antibiotics orally and regularly for all forms of the disease can prove effective. As with all disease challenges, ensure to consult a veterinarian before embarking on a medical intervention. Ask the veterinarian to take fecal swabs so that a qualified laboratory can conclusively identify the disease-causing agent affecting the herd. Once proper identification of the E. coli organism causing disease on farm has been confirmed, an effective antibiotic regimen can be recommended.

In severe cases, fluids and electrolyte therapy may be necessary to save a calf's life. A veterinarian should be consulted to obtain the appropriate electrolyte mixture (there are several commercially available forms of electrolytes designed specifically for calves experiencing scours challenges). Become familiar with the products that are available on the market and their proper usage before calving starts.

It is advised to feed electrolytes separately from (20-30 minutes after) milk or milk replacer solution, as they may interfere with clot formation in the abomasum. This may increase the rate of abomasal emptying into the intestine and worsen the scour condition. Often veterinarians recommend a full dose of electrolytes for 1 day and ½

dose for 2-3 days thereafter. If a calf is severely dehydrated, intravenous administration may be necessary.

FURTHER READING

Here are a few suggested websites that will provide more detailed information on various aspects of calf management and nutrition:

Ontario Veal Association

www.calfcare.ca

www.ontarioveal.on.ca

This website, created by the *Ontario Veal Association*, has pulled together calf rearing resources into a single website designed to help you improve the way calves are raised on your farm.

Charlton, S.J. (2009). **Calf Rearing Guide – Practical and Easy to Use**. Context Books. ISBN 978-1-899043-13-2

The “Calf Rearing Guide” published in conjunction with the *Ontario Veal Association*, provides a very practical compendium of relevant physiology, nutrition, management and health information which might prove invaluable to dairy producers right across the country, and has been tailored to Canadian producers.

Ontario Ministry of Agriculture, Food & Rural Affairs

[OMAFRA Livestock Index Page](#)

The OMAFRA website provides good information on the health, management and nutrition of calves reared in central Canada, with links to other excellent calf rearing websites.

National Farm Animal Care Council

<http://www.nfacc.ca/codes-of-practice/dairy-cattle>

The National Farm Animal Care Council has developed many Codes of Practices for various classes of livestock, which in turn has been adopted/referenced by the CFIA. This website provides additional information pertinent to dairy cows as well as calves and replacement heifers.

Calf Notes.com

www.calfnotes.com

Calf Notes.com©, developed by **Dr. Jim Quigley**, discusses health, management and nutrition information about raising calves and heifers. Calf Notes is a great source for pertinent, non-commercial and unbiased information on raising young dairy calves and replacement heifers.

NOTE: Calf Notes references the American experience, and some of the philosophies described therein may not be applicable to the Canadian experience. For instance, the Canadian Food Inspection Agency (CFIA) and various provincial agricultural ministries are touting higher milk replacer/milk feeding rates – up to 20% BW – in keeping with the Canadian National Farm Animal Care Council's Dairy Code of Practices. This can be in direct contrast to the views expressed in American publications advocating restricted milk replacer/ milk feeding and early weaning on to calf starter.