DAIRY PRODUCTION

Level III

Learning Guide -54

Unit of Competence:- **Collect, storing and administer colostrum**

Module Title:- **Collecting, storing and administering colostrum**

LG Code: **AGR DRP3 M14 LO1-LG-54**

TTLM Code: **AGR DRP3 M14 TTLM 0120v1**

LO1:- Obtain colostrum

Instruction Sheet	Learning Guide 50

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics –

- Obtaining, checking and sterilizing required equipment
- Identifying suitable donor animals and collecting colostrum
- Obtaining artificial colostrum from stocks

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to –

- Obtain, checking and sterilizing required equipment
- Identify suitable donor animals and collecting colostrum
- Obtain artificial colostrum from stocks

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 1 to 7
3. Read the information written in the “Information Sheets 1”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
4. Accomplish the “Self-check 1,2,3,4&5” **in page -. 5,9,11,15,19 respectively**
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 1).
6. If you earned a satisfactory evaluation proceed to “Information Sheet 2”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
7. Submit your accomplished Self-check. This will form part of your training portfolio.

Information Sheet-1	Obtaining, checking and sterilizing required equipment

1.1. Proper collection techniques

- Prepare teat ends of fresh cows by stripping and pre-dipping prior to collecting colostrum.
  - ❖ In cows treated with teat sealant, strip the teat until sealant has been cleared prior to collection.
- Ensure milking equipment is clean prior to collection.
- Have a collection bucket (Photo 1) designated for colostrum collection only.
  - ❖ Rinse milk bucket with lukewarm water prior to use (less than 120 degrees F).
  - ❖ Collect colostrum.
  - ❖ After use of collection equipment, rinse equipment again with lukewarm water, followed by wash out with hot water and soap (120 degrees F; similar to parlor cleaning technique).

Figure1. Coloustrm collection equipment

Figure2. Coloustrm collection equipment

Figure3. Coloustrm collection equipment

Cleaning protocol for bottles, buckets, nipples, esophageal feeders and colostrum-collection equipment:

- Rinse the equipment with warm (90-100˚F) water to remove all soils, including milk solids.
- Wash with a chlorinated alkaline manual/foam cleaner (pH 11-12) and one cup of bleach by way of brush, or use soap product from dairy supply company at 135-140˚F. Dump to drain.
- Rinse with warm (90-100˚F) water and dump to drain.
- Hang upside down on a wall (not on the floor or stacked) to dry completely.
- Prior to use, sanitize with chlorine dioxide at 50 ppm residual (2.5 oz. concentrate/gallon of water). Wait 5 minutes before using, and do not dry or rinse prior to use. Verify disinfectant concentration with high-range (0-500 ppm) test strips.

The dairy industry may reap benefits from application of sterilization and aseptic packaging if proper emphasis is given to:

(a) Quality of raw materials;
(b) Efficiency of processing and packaging equipment;
(c) Formulation, processing, and packaging of products; and
(d) Careful handling of finished products.

Self-Check -1	Written test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write the collestrrem collection equipment?
2. what is sterilization and aseptic packaging if proper emphasis?

Note: **Satisfactory rating - 3 points** **Unsatisfactory - below 3 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

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Information Sheet-2	Select suitable donor animals and collect colostrum

The first breast milk your body makes is known as colostrum. This is the perfect source of nutrition for your baby because it:

- Contains antibodies which protect your baby from infection and help their immune system to develop.
- Helps your baby's digestive system to develop, which protects your baby from allergies.
- Encourages your baby to open their bowels and pass 'meconium' (your baby's first black sticky poo) which reduces the risk of jaundice. Colostrum is very concentrated. At birth, a baby's stomach is about the size of a marble, so they will only need a small amount of colostrum to receive all the nutrients they need.

2.1. Cow management affects colostrum

- Management Prior to Calvingo Vaccinate cows when entering the dry period to maximize the effect of colostrum.

    - ❖ Vaccine-generated antibodies against viruses/bacteria will be transferred to calfvia colostrum.

        - Killed vaccines that include IBR, BVD, PI3 and BRSV are recommended and safe for pregnant cows.
        - Core vaccines to include for future replacements: clostridials (blackleg),IBR/BVD/PI3/BRSV and leptospirosis.
        - Modified live vaccines are not recommended for pregnant heifers or cows who have not been exposed to a modified live vaccine previously.

- Consult with your veterinarian on a vaccination protocol that best suits the needs of your farm.

❖ Adequate nutrition of the dam provides nutritional benefits to the calf

- The University of Minnesota found when feeding increased energy and protein 21days prior to calving, there was an increase in quality of colostrum.
- According to the University of Florida and the New York State College of Veterinary Medicine, maintaining a body condition score 3.0-3.5 resulted in higher quality colostrum.

➢ Your midwife will discuss colostrum harvesting with you when you are 26 to 30 weeks pregnant, if it is appropriate. However, the benefits of colostrum harvesting may not become apparent until much later in your pregnancy. It is never too late to start colostrum harvesting.

2.2. Colostrum harvesting

During your pregnancy, your breasts will start to produce colostrum (the exact timing varies from person to person). You can collect and freeze this milk during the last few weeks of your pregnancy. This is known as ‘colostrum harvesting’.
Harvesting your colostrum will be especially beneficial for your baby if they are likely to have difficulties with feeding or maintaining their blood sugar levels during the first few days after birth.

This may be because your baby:

➢ Is large or small for their gestational age
➢ Is a twin or triplet
➢ Has a cleft lip or palate
➢ Has Down’s syndrome or a heart complication

Colostrum harvesting can also be beneficial for your baby if you:

- Are taking beta blockers to control high blood pressure
- Have developed pre-eclampsia during pregnancy
- Are diabetic or have developed diabetes during pregnancy
- Have polycystic ovary syndrome
- Have breast hypoplasia (a condition in which the breast doesn't fully develop) or you have had breast surgery
- Have a raised body mass index (BMI)
- Plan to give birth by Caesarean section If your baby needs extra feeds, you may be able to use your colostrum instead of formula milk.

Self-Check -2	Written test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Who Cow management affects colostrum collection ?

2. What the benefit of colostrum for our calves ?

Note: **Satisfactory rating - 3 points** **Unsatisfactory - below 3 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

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Information Sheet-3	Obtaining artificial colostrum from stocks

3.1. Definition

Artificial colostrum can also be a good source of nutrients for a new born calf, an example composition of artificial colostrum: one egg (protein source) + half litre fresh warm water + half litre whole milk (source of lactose and milk protein) + one teaspoonful castor oil (energy) + one teaspoonful of cod liver oil

3.2. Preparation of artificial colostrum for a calf

Artificial Colostrum.

A calf should be fed with colostrum within 6hrs after birth to improve immunity and made vsure that they have as much as possible within 24hrs of being born.

However, more often than not, a calf may not be able to suckle due to death of the dam. In this case, there are several options you can do to get the calf meet its colostrum requirement.

Today, I want u to learn how to prepare artificial colostrum:

1. Get one fresh egg (proteins)
2. Also 0.5litr whole milk (whole meal)
3. Warm Water, 0.5lt
4. Cod liver oil 1 tea spoonful (vitamins)
5. Castor oil 1 table spoonful (laxative effect)

NB: Artificial colostrum should be fed to the calf 3 times daily for the first 4 days and there after the castor may be omitted in the mixture when the calf starts to pass dung normally.

Importance of artificial colostrum for calves

The Importance of Colostrum to the Newborn Calf. Antibodies in colostrum provide calves with their initial protection. Time is important because a newborn calf's digestive tract allows antibodies to pass directly into the blood. After 24 hours, the calf's intestines cannot absorb antibodies intact.

Self-Check -3	Written test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is artificial colostrum ?

2. Write ingredient for artificial colostrum preparation ?

Note: **Satisfactory rating - 3 points** **Unsatisfactory - below 3 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

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Information Sheet-4	Check frozen colostrum stored and select suitable ones for use

In this section will see colostrum storage ,before that let see some colostrum pasteurization

4.1. Colostrum pasteurization

Why and When to Pasteurize?

1. Most contagious pathogens on the dairy are also going to be shed in colostrum. Pasteurization will eliminate or greatly reduce this risk.
2. Colostrum must be pasteurized at 60°C/140°F for 60 minutes in order to destroy pathogens, maintain viscosity of the final product and to preserve the delicate Ig molecules.
3. Pasteurize as quickly as possible after harvesting colostrum to preserve the quality.
4. Pasteurization of colostrum will lead to improved absorption of Ig into the calf which in turn results in less sickness, less mortality, better weight gain and more future production.
5. Removing pathogens from this first feeding also improves the long term biosecurity of the herd.

How to Pasteurize in Bulk

1. Cleanly transfer colostrum into the open Perfect Udder® COMBI Pasteurizer and replace lid.
2. Choose the PASTEURIZE profile from the options menu
3. The colostrum will automatically heat to 60°C/140°F and hold there for 60 minutes before cooling back to a feeding temperature.
4. Use the spout adapter on the exit valve to fill Perfect Udder® bags from the front of the machine.
5. Then properly label the bags with the date and quality of the colostrum.
6. Either feed the colostrum immediately or cool the colostrum in the refrigerator or freezer. Do not stack bags until they have cooled completely.

7. Clean the pasteurizer with a warm water rinse, scrub with hot water and detergent, followed by final rinse and non-acidic disinfectant spray on all surfaces.
8. Remove the valve and clean thoroughly after each use.

4.2. Colostrum storage

Storing colostrum in the fridge or freezer gives flexibility to the colostrum feeding program. Storing colostrum gives flexibility to the colostrum feeding program in having colostrum accessible in the event that the dam does not have enough or it's of low quality, bloody, or the dam will not be milked within two hours of giving birth.

Colostrum storage place

Colostrum can be stored in the fridge or the freezer. According to NAHMS, of the producers storing colostrum. Storing colostrum in the freezer gives longer shelf-life, however it will take longer to thaw and warm to body temperature. In addition, the process of freezing and thawing destroys white blood cells, or leukocytes. A benefit to freezing colostrum is that Bovine Leukemia Virus is stored in the white blood cells and is effectively inactivated by freezing and thawing colostrum. It is not recommended to store colostrum in a "frost-free" freezer because of freeze-thaw cycles that could damage colostral antibodies.

Figure 2. Colousrm storage

Colostrum storage duration

While not everyone is in agreement on the maximum time to store frozen colostrum, it is generally agreed upon that colostrum can be stored up to six months without damage to antibodies. How long colostrum will stay good in the refrigerator depends on the cleanliness of your colostrum and storage equipment. In general, two to three days is the longest Michigan State University Extension recommends storing colostrum in the refrigerator.

High-bacteria colostrum needs to be used sooner and very clean colostrum can be kept longer. Using a preservative, such as potassium sorbate, will stop bacterial growth and extend the length of time colostrum can be stored, up to seven days. Food grade potassium sorbate is very affordable and can be purchased online and mixed on-farm. Many vet clinics offer the pre-mixed product to farms, saving the hassle of mixing and ensuring it stays fresh.

Cleanliness of colostrum

Whichever way you chose to store colostrum, the basic principles of cleanliness still apply.

- Milk cows using clean equipment, and
- Store colostrum in clean.
- If freezing colostrum, it is a good idea to use bags with a label of date and quality, that will stack neatly, and the increased surface area of the bag will rapidly cool and thaw the colostrum.
- Freezing will stop bacterial growth however it will not decrease the bacterial counts that are already present when put into the freezer.
- Consider pre-chilling the colostrum in an ice bath before placing in the fridge or freezer. Pre-chilling will rapidly cool the colostrum, preventing the refrigerator from warming and causing harm to other colostrum or vaccines stored in the fridge.

Self-Check -4	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. what is colostrum storage?
2. what is colostrum pasteurization?

Note: **Satisfactory rating - 3 points** **Unsatisfactory - below 3 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

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Information Sheet-5	Select, use and maintain appropriate Personal Protective Equipment (PPE)

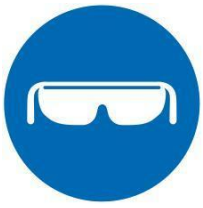
PPE means personal protective equipment or equipment you use to guarantee your (own) safety. Use PPE always and anywhere where necessary.

These 6 tips will help you on your way.

1. Safety for the head

Wearing a helmet offers protection and can prevent head injuries. Select a sturdy helmet that is adapted to the working conditions. These days you can find many elegant designs and you can choose extra options such as an adjustable interior harness and comfortable sweatbands.

2. Protect your eyes



The eyes are the most complex and fragile parts of our body. Each day, more than 600 people worldwide sustain eye injuries during their work. Thanks to a good pair of safety glasses, these injuries could be prevented. Do you come into contact with bright light or infrared radiation? Then welding goggles or a shield offer the ideal protection!

3. Hearing protection

Do you work in an environment with high sound levels? In that case it is very important to consider hearing protection. Earplugs are very comfortable, but earmuffs are convenient on the work floor as you can quickly put these on or take them off.

4. Protect your hands with the right gloves

Hands and fingers are often injured, so it is vital to protect them properly. Depending on the sector you work in, you can choose from gloves for different applications:

- Protection against vibrations
- Protection against cuts by sharp materials
- Protection against cold or heat
- Protection against bacteriological risks
- Protection against splashes from diluted chemicals.

5. Protection for the feet

Even your feet need solid protection. Safety shoes (type Sb, S1, S2 or S3) and boots (type S4 or S5) are the ideal solution to protect the feet against heavy weights. An antiskid sole is useful when working in a damp environment, definitely if you know that 16,2% of all industrial accidents are caused by tripping or sliding. On slippery surfaces, such as snow and ice, shoe claws are recommended. Special socks can provide extra comfort.

6. Wear the correct work clothing

Preventing accidents is crucial in a crowded workshop. That is why a good visibility at work is a must: a high-visibility jacket and pants made of a strong fabric can help prevent accidents. Just like the hand protection, there are versions for different applications.

Worst-case scenario

Prevention is better than cure. A smart thing is to be prepared for the worst. A classic first-aid kit is no luxury but a first-aid kit for the eyes can also be an essential first aid. If the employee comes into contact with chemicals, a safety shower is mandatory, so that he can rinse the substances off his body at any moment.

Preventing accidents: pictograms

Not only is preparing your workshop for accidents a smart thing to do, it is even smarter to organize your workshop in such a way that no serious accidents can take place. A simple way to make your workshop safer is to use pictograms: indicating flammable materials, the necessary use of hearing protection, indicating emergency exits …

Self-Check -5	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. what is PPE?
2. what is importance of PPE?

Note: **Satisfactory rating - 10 points** **Unsatisfactory - below 10 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

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Operation Sheet 1	Colostrum pasteurization

Techniques to Colostrum pasteurization

Step 1. Cleanly transfer colostrum into the open Perfect Udder® COMBI Pasteurizer and replace lid.

Step 2. Choose the PASTEURIZE profile from the options menu

Step 3. The colostrum will automatically heat to 60°C/140°F and hold there for 60 minutes before cooling back to a feeding temperature.

Step 4. Use the spout adapter on the exit valve to fill Perfect Udder® bags from the front of the machine.

Step 5. Then properly label the bags with the date and quality of the colostrum.

Step 6. Either feed the colostrum immediately or cool the colostrum in the refrigerator or freezer. Do not stack bags until they have cooled completely.

Step 7. Clean the pasteurizer with a warm water rinse, scrub with hot water and detergent, followed by final rinse and non-acidic disinfectant spray on all surfaces.

Step 8. Remove the valve and clean thoroughly after each use.

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Operation Sheet 2	Artificial Colostrum preparation

Techniques to Artificial Colostrum preparation

Step 1. Get one fresh egg (proteins)

Step 2. Also 0.5litr whole milk (whole meal)

Step 3. Warm Water, 0.5lt

Step 4. Cod liver oil 1 tea spoonful (vitamins)

Step 5. Castor oil 1 table spoonful (laxative effect

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within --- hour.

Task 1. Colostrum pasteurization

Task 2. Artificial Colostrum preparation

References

Marshall, R.T. (1992) Standard Methods for the determination of Dairy Products. 16th ed. Publ. American Public Health Association.

Richardson, G.H. (1985) Standard Methods for the examination Dairy Products 15th edition, American Public Health Association, Washington

Smith, P. W. 1981. “Milk Pasteurization” *Fact Sheet Number 57*, U.S. Department of Agriculture Research Service, Washington, D.C.

DAIRY PRODUCTION

Level III

Learning Guide -55

Unit of Competence:- **Collect, storing and administer colostrum**

Module Title:- **Collecting, storing and administering colostrum**

LG Code: **AGR DRP3 M14 LO2-LG-55**

TTLM Code: **AGR DRP3 M14 TTLM 0120v1**

LO2:- Administer colostrum to newborn animals

Instruction Sheet	Learning Guide 55

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics –

- Identifying newborn animals requiring supplementary colostrum
- Obtaining and preparing feeding equipment
- Thawing frozen colostrum at room temperature
- Warming thawed colostrum to body temperature
- Administering warmed colostrum to newborn animals according to individual animal requirements and workplace procedures
- Checking newborn animals regularly after administration of colostrum and repeat colostrum feeds as required

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to –

- Identify newborn animals requiring supplementary colostrum
- Obtain and prepare feeding equipment
- Thaw frozen colostrum at room temperature
- Warm thawed colostrum to body temperature
- Administer warmed colostrum to newborn animals according to individual animal requirements and workplace procedures
- Check newborn animals regularly after administration of colostrum and repeat colostrum feeds as required

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 1 to 7

3. Read the information written in the “Information Sheets 1”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.

4. Accomplish the “Self-check 1,2,3,4,5&6” **in page -. 7,10,13,15,18,21**

5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 1).

6. If you earned a satisfactory evaluation proceed to “Information Sheet 2”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.

7. Submit your accomplished Self-check. This will form part of your training portfolio.

Information Sheet-1	Identifying newborn animals requiring supplementary colostrum

1.1. Process newborns calves

Processing newborn calves is an important job, and with an excellent system in place it is possible to prepare calves to have a healthy productive life.

The following is a list of common practices in successful calf management systems:

- Move calves to a clean and dry environment immediately after birth to reduce the chances of environmental bacterial contamination.
- Dip the navel or umbilical cord in chlorohexidine solution or 7% iodine as possible after birth to disinfect and prevent bacteria from infecting the newborn

The concentrations of protein and vitamins A, D and E in colostrum are initially about five times those of whole milk, with a protein content of 17–18% compared with milk's 2.5–3.5%. However, within 2 days these are little different from those in whole milk. The levels of vitamins in colostrum are dependent on the vitamin status of the cow. The blood proteins transfer passive immunity from mother to offspring through maternal antibodies or immunoglobulins (Ig). The chances of calves surviving the first few weeks of life are greatly reduced if they do not ingest and absorb these antibodies into their bloodstream. It takes far fewer disease organisms to cause disease outbreaks in such calves than if they can acquire immunity from their dam. Calves without adequate passive immunity are four times more likely to die and twice as likely to suffer disease, than those with it. Furthermore in certain situations, blood levels of antibodies in heifer calves are directly related to their milk production in later life. The term colostrum is generally used to describe all the milk produced by cows up to 5 days after calving, until it is acceptable for use by milk factories. However, a more correct term for milk produced after the second milking post-calving is transition milk (Moran 2002). This milk no longer contains enough Ig to provide maximum immunity to calves, but still contains other components, which reduce its suitability for milk processing. Milk factories can now test for and penalise farmers who include transition The calf should be

assisted for its first suckle from its dam. 44 Rearing Young Stock on Tropical Dairy Farms in Asia milk in their milk vat. Because it has no market value, transition milk should all be fed to calves to reduce their total feed costs. However, it must be stressed that the immune properties of this pooled milk are much reduced once first milking colostrum is diluted with that from second or later milkings. When considering colostrum feeding to dairy calves, it should be appreciated that modern milking cows are vastly different to the primitive, feral cows from which they evolved thousands of years ago. Their udders are much larger and often hang too low for easy suckling by their offspring. They produce vastly greater quantities of milk, which means that their first and second milking colostrum is much more dilute than is desirable for optimum quality. Furthermore, because mothering ability has little relevance on dairy farms and has probably been bred out of cows, they may be less likely to want to suckle their progeny immediately after birth. This is still not the case with beef cows, where unassisted suckling is a highly efficient means of passive transfer of immunity in beef calves. These natural methods are less effective in dairy herds, meaning that farmers often have to rely on so-called less natural techniques.

Current recommendations on colostrum feeding

Recommendations for colostrum feeding have changed dramatically over the last two decades. Twenty years ago, it was considered acceptable for all calves to run with their dams for 1, 2 or even 3 days and for her to pass on passive immunity through natural suckling. As producers learnt more about the causes and prevention of calf diseases, they became more ‘colostrum conscious’. Current advice to farmers is to ensure all calves drink from their dam within the first 3–6 hr of life and, if not, to provide additional colostrum from its mother or another freshly calved cow. Colostrum quality can be assessed visually, or more accurately, using a colostrometer, which works on the same principle as the hydrometer used to measure the acid level in car batteries. Recently, more sensitive field test kits have become available to calf rearers in many countries. Two feedings during the first day, 6–12 hr apart, and each of 2 L of good-quality colostrum used to be considered sufficient to provide passive immunity, mainly because of concern about the small capacity of the

abomasum in newborn calves. However, US advisers now recommend that dairy farmers remove the calf as soon as possible after birth (within 15 min) and feed it 3–4 L of top-quality colostrum at one feeding

Newborn calves

Orphan calves often show signs of dehydration, depression, lack of appetite or scouring. If the calf is to survive, proper care during the first 24 hours is critical.

It is essential for the newborn calf to receive colostrum. Colostrum is the first milk that a mother produces. Colostrum provides passive immunity to disease and helps build up vitamin and mineral levels. The new-born calf should get colostrum within the first 36 hours of birth – either from a mother or artificial sources. A supply of frozen colostrum can be kept in the freezer, while some milk replacers also contain colostrum. Once the calf has received colostrum, it can be fed solely on whole milk or milk replacers. It is handy to have a bottle of colostrum in the freezer to feed newborn calves that may not have drunk from their mothers. Warm it up to 36°C before feeding and if you have ample supply, feed it for the first two days (normally up to 2L per feed), in the morning and evening.

Dehydrated calves

The calf should be rehydrated before getting any milk. Feeding a dehydrated calf with milk often results in scours and possibly death. Electrolyte mixtures are commercially available or can be mixed at home from 1 teaspoon table salt, ½ teaspoon baking soda and 125mL glucose in 1.2L of water. Electrolyte should be fed for at least 24 hours before milk is given.

Teat or bucket feeding

Cattle are ruminants and have four stomachs. At birth, the abomasum or fourth stomach is the only stomach that is functioning. Feeding using teats may be harder work however when a calf sucks, it triggers a reflex which causes a groove in the rumen – the oesophageal groove, to close and direct milk past the rumen and into the abomasum where it is digested.

Using a teat may also stimulate saliva production and maintain fluid intake in scouring calves. Teats have to be kept clean and replaced when they deteriorate.

In contrast if a calf drinks from a bucket, the reflex is often not activated and the milk goes into the rumen. As the rumen is not functioning the milk is not digested and ferments causing the calf to scour. If a bucket is used, its base should be placed at least 30cm above the ground to help the oesophageal groove to close. To train a calf to drink from a bucket, back it into a corner, stand astride its neck and place two fingers moistened with milk into its mouth. Whichever method is used, each calf must receive a measured amount of milk daily.

As the calf grows and starts to graze, the other stomachs (rumen, reticulum and omasum) start to develop. Therefore, it is important to provide clean, good quality hay for the calf to eat to help stimulate rumen development.

Self-Check -1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. what is colostrum supplementation ?

Note: **Satisfactory rating - 10 points** **Unsatisfactory - below 10 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

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Information Sheet-2	Obtaining and preparing feeding equipment

2.1. Clean colostrum equipment

When harvesting colostrum, it is imperative to keep cleanliness on your mind. Inflations, buckets, bottles and nipples should all be kept clean along with the animal's udder.

Before and after feeding newborn calves, Kelly Reed, DVM, ruminant field technical specialist with Diamond V suggests these tips:

- **Develop a colostrum protocol** – Just like you would develop a procedure for employees to follow when milking, it is also a good idea to develop a standard operating procedure when handling colostrum.
- **Use lukewarm water to pre-rinse** – "If we use really hot water, we are going to denature the proteins, causing them to stick on surfaces," Reed explains. "If we use too cold of water, the fat is just going to stay stuck."
- **Soak equipment with hot, chlorinated water** – This will help reduce the number of bacteria.
- **Vigorously wash calf feeding equipment** – Reed recommends vigorously scrubbing calf feeding equipment to help remove any pathogens that might remain.
- **Rinse with cold water**
- **Rinse a second time with an acidic solution** – Using an acid-based solution with a pH of 2-3 will help kill any remaining organisms that may have survived.
- **Allow equipment to dry**– One of the most important steps to help ensure clean colostrum handling equipment is allowing these tools to completely dry. If possible, Reed suggests using drying systems to help remove some of the remaining water.

Figure Clean Coloustrm feeding equipment

Self-Check -2	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. what is the importance of cleaning equipment ?

Note: **Satisfactory rating - 10 points** **Unsatisfactory - below 10 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

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Information Sheet-3	Thaw frozen colostrum at room temperature

3.1. Refrigerating colostrum.

Colostrum can be refrigerated for only about 1 week before quality (Ig concentration) declines. If you refrigerate colostrum, be sure that the refrigerator is cold (33-35°F, 1- 2°C) to reduce the onset of bacterial growth. If the colostrum begins to show signs of souring, the quality of the colostrum is reduced. The IgG molecules in colostrum that convey passive immunity to the calf will be degraded by the bacteria, reducing the amount of immunity that the colostrum can provide. Thus, it is important that colostrum be stored in the refrigerator for only a short time.

3.2 Freezing colostrum.

Colostrum may be frozen for up to a year without significant decomposition of Ig. One research report indicated that colostrum was stored for 15 years without serious deterioration of IgG content. Frost-free freezers are not optimal for long-term colostrum storage. They go through freeze-thaw cycles that can allow the colostrum to thaw. This can markedly shorten colostrum storage life. Freezing colostrum in 1 or 2 liter bottles or 1 quart (liter) in 1 or 2 gallon zipclosure storage bags is an excellent method of storing colostrum. We have had great success using the zip-closure bags. Use two bags to minimize the chance of leaking, and lay them flat in the freezer. By laying the bags flat, the rate of thawing can be increased, thereby reducing the delay between birth and feeding. The freezer should be cold (-20°C, -5°F) - it's a good idea to check your freezer occasionally.

3.3. Thawing colostrum.

The main concern regarding thawing frozen colostrum is to thaw the ice without degrading the immune proteins. This is best done with warm (not hot) water (< 120°F, 50°C) and allowing to thaw. Alternately, colostrum can be thawed in a microwave oven with little damage to the Ig. It is important to microwave the colostrum for short periods on low power.

Pour off the thawed liquid periodically to minimize heating. It is also important to avoid "hot spots" inside the frozen colostrum. Use of a turntable can help to minimize damage to Ig. Researchers at Cornell reported that this method can be quite effective in thawing colostrum with little damage to the Ig molecules. The bottom line... Colostrum is an excellent source of nutrition and immune proteins for the calf. Treat is as a precious commodity. Protect the IgG molecules by freezing (for storage > 1 week) and gentle thawing. Your calves will thank you.

3.4. Colostrum management

Is your fridge or freezer good enough to store colostrum? Think about the value of colostrum in preventing disease and milk production, or even the cost of powdered colostrum – the price of a reliable fridge becomes well worth it to protect this valuable resource.

Self-Check -3	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is colostrum refrigerating ?
2. What is colostrum freezing ?

Note: **Satisfactory rating - 10 points** **Unsatisfactory - below 10 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

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Information Sheet-4	Warming thawed colostrum to body temperature

4.1. Warming thawed colostrum

It is no secret that colostrum provides the antibodies a calf needs to build immunity. The antibodies, specifically called immunoglobulins in colostrum, are absorbed in the calf's small intestine in the first few hours of life. Therefore, it is important that newborn calves receive colostrum within four hours of birth.

It is a common practice, when a calf is born to remove frozen colostrum from the freezer to thaw in hot water and then continue to perform newborn calf cares. The water temperature to thaw the colostrum should be between 120° F and 140° F (49-60° C). Water temperature above 140° F (60° C) is inactivating the immunoglobulins in the colostrum, thus decreasing the amount of immunoglobulins absorbed in the small intestine.

A good rule of thumb is if the water is too hot for you to stick your hand into, it is too hot to thaw colostrum.

As the newest calf is born and you prepare newborn calf cares, keep in mind these three reminders.

1) Feed high quality colostrum (22% Brix or greater) within four hours of birth.

2) The water temperature to thaw colostrum should be between 120-140° F (49-60° C).

3) Measuring colostrum quality measures the total amount of immunoglobulins; the number of inactive immunoglobulins increases as the colostrum becomes too hot thus reducing colostrum quality fed to the calf.

The water temperature to thaw the colostrum should be between 120° F and 140° F (49-60° C). Water temperature above 140° F (60° C) is inactivating the immunoglobulins in the colostrum, thus decreasing the amount of immunoglobulins absorbed in the small intestine.

Self-Check -4	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Why colostrum warming ?

Note: **Satisfactory rating - 10 points** **Unsatisfactory - below 10 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

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Information Sheet-5	Administer warmed colostrum to newborn animals according to individual animal requirements and workplace procedures

5.1. Administering High Quality Colostrum to the Newborn Calf

Passive Immunity in cattle is the short term immunity transfer from mother to offspring by way of colostrum consumption. This is very important in cattle because during pregnancy there is no transport of antibodies across the placenta. Therefore, calves are born with a naïve immune system, basically they do not have an active immune system of their own. Colostrum contains antibodies, technically called immunoglobulins (Ig), for priming the calf's immune system; in addition it has a high content of fat to provide energy to the calf. A newborn calf's small intestine is permeable or "open" and is able to absorb the Ig contained in colostrum; however, it can also absorb environmental pathogens that can cause diseases. For this reason, it is important that newborn calves receive colostrum as soon as possible not later than 3 hours of birth and the calving pen must be kept clean to reduce the bacterial load to which newborn calves are exposed to.

The four Qs of colostrum feeding

Quality	Quantity	Quickly	Quietly
Measure IgG levels	Feed a minimum of three litters per calf	Feed a minimum of three liters per calf	Minimise stress to maxmise IgG absorption
Review factors influencing quality			
Maintain good hygiene			
Feed or freeze quickly			

5.2. Processing newborns calves

Processing newborn calves is an important job, and with an excellent system in place it is possible to prepare calves to have a healthy productive life. The following is a list of common practices in successful calf management systems:

- Move calves to a clean and dry environment immediately after birth to reduce the chances of environmental bacterial contamination.
- Dip the navel or umbilical cord in chlorohexidine solution or 7% iodine as possible after birth to disinfect and prevent bacteria from infecting the newborn.

Self-Check -5	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Why administering high quality colostrum ?

Note: **Satisfactory rating - 10 points** **Unsatisfactory - below 10 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

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Information Sheet-6	Check newborn animals regularly after administration of colostrum and repeat colostrum feeds as required

6.1. Colostrum feeding schedule for calves

The first 24 hours are crucial for development of the immunity of the newborn calf. Calves must receive a considerable volume of colostrum within an hour of calving. The Spray fo advice for colostrum feeding in the first 3 days is shown below.

Within an hour of calving

The first colostrum feed will determine the calf's resistance to disease in the first weeks of its life. This probably makes it the most important meal the animal will ever have. The absorption capacity for antibodies is highest in calves during that first hour after birth, and decreases with each passing hour. The first feed is all about speed, quality, volume and temperature. Sprayfo advises:

4 litres of colostrum within 1 hour of calving. the quality of the colostrum must be checked for the concentration of antibodies (colostrum meter) and purity (optical). colostrum temperature of 40 degrees, as close as possible to the calf's body temperature.

Within 24 hours

After a good first feed, the calf can cope for a while. The second feed should be given at least 12 hours after the first. If the calf has drunk 4 litres in its first feed, approximately 2 litres of colostrum will suffice as a second feed. Do not force calves when giving the second feed: 4 to 6 litres is sufficient on day one. From the second feed on, you can use mixed colostrum from healthy cows.

Days 2 and 3

On days two and three, feed 2 times 3 litres of transition milk (the milk following the colostrum which is not accepted for factory processing). This should preferably be given using a rearing bucket with the teat at 70 cm height. In the first days in particular, the sucking action of the calf has a positive effect on digestion of the milk, the reticular groove reflex and the enzyme production (thanks to the production of extra saliva).

This milk must also have a temperature of around 40 degrees. It is therefore important that the calf drinks this milk quickly, rather than a puddle of cold milk being left in the bucket for hours.

Self-Check -6	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is Colostrum feeding schedule for calves ?
2. How colostrum feeding?

Note: **Satisfactory rating - 10 points** **Unsatisfactory - below 10 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

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References

Marshall, R.T. (1992) Standard Methods for the determination of Dairy Products. 16th ed. Publ. American Public Health Association.

Richardson, G.H. (1985) Standard Methods for the examination Dairy Products 15th edition, American Public Health Association, Washington

Smith, P. W. 1981. “Milk Pasteurization” *Fact Sheet Number 57*, U.S. Department of Agriculture Research Service, Washington, D.C.

DAIRY PRODUCTION

Level III

Learning Guide -54

Unit of Competence:- **Collect, storing and administer colostrum**

Module Title:- **Collecting, storing and administering colostrum**

LG Code: **AGR DRP3 M14 LO3-LG-56**

TTLM Code: **AGR DRP3 M14 TTLM 0120v1**

LO3:- Store colostrum

Instruction Sheet	Learning Guide 56

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics –

- Filtering colostrum and placing in appropriate container
- Labeling surplus colostrum and freezing for future use

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to –

- Filter colostrum and placing in appropriate container
- Label surplus colostrum and freezing for future use

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 1 to 7
3. Read the information written in the “Information Sheets 1”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
4. Accomplish the “Self-check 1&2” **in page -.3,7**
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 1).
6. If you earned a satisfactory evaluation proceed to “Information Sheet 2”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
7. Submit your accomplished Self-check. This will form part of your training portfolio.

Information Sheet-1	Filtering colostrum and placing in appropriate container

1.1. Filtering colostrum

Filtration is preferably carried out with defatted colostrum, the method in accordance with the invention is also appropriate for colostrum that has not been defatted. The rate of filtration is admittedly definitely lower than that of defatted colostrum but still substantially above that of colostrum that has not been acid treated.

Bovine colostrum collected within 30 hours of calving contains high levels of immunoglobulins G, A, and M. The substance also contains other proteins that make it ideal for providing calves with a passive immunity, especially against entero-pathogenic germs, during their first few days.

Bovine colostrum is about 12% protein and contains cell particles and a large number of bacteria.

Filtration sterilization, the simplest and most effective method of eliminating the bacteria and the method that best protects the proteins, cannot be employed with colostrum because the casein immediately clogs up the filter.

All methods that are intended to produce a preparation that can be filtered sterile or ultra filtered accordingly start from the optionally defatted whey. The casein is acid or enzyme precipitated and centrifuged out while the whey is being prepared. The whey or its isolated fractions can then be ultra filtered and filtered sterile.

Self-Check -1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is the important filtering Colostrum feeding ?

Note: **Satisfactory rating - 10 points** **Unsatisfactory - below 10 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

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Information Sheet-2	Labeling surplus colostrum and freezing for future use

2.1. Label the collection container

Labels should include the baby's name, the date, the time of day pumped, and any medicines or substances, such as cigarette byproducts that you have taken, or been exposed to since the last pumping session.

- If using unrefrigerated, fresh breastmilk, it should be fed to a baby within an hour of being pumped. Don't leave milk out longer than 30 to 60 minutes when it is to be given to a high-risk baby. This risks contamination--something a high-risk baby does not need.
- It is not always possible to give a baby fresh breastmilk. Or you may get more than needed for a feeding and want to save the milk for later use. In these cases, refrigerate your milk in the labeled collection bottles right away. The refrigerator should be at a temperature of 32°F to 39°F (0°C to 3.9°C).
- Freeze labeled collection bottles if the milk will not be used within 24 to 48 hours. The NICU staff will let you know whether they are using 24 hours or 48 hours as a guideline.
- Don't freeze breastmilk that has been refrigerated for more than 24 to 48 hours. Although milk has been shown to be safe when refrigerated for several days, experts usually recommend freezing milk sooner when it is to be given to a high-risk baby.
- Freeze breastmilk in small amounts so that only what your baby needs is thawed each time. After breastmilk has been thawed, it must be used within 24 hours (if thawed in the refrigerator), or 4 hours (if warmed) or it must be discarded. Your baby's nurse can help you to know how much your baby needs daily.

Frozen breastmilk may be kept:

- Up to 2 weeks if the freezer compartment is within the refrigerator. You must open the refrigerator door to reach the freezer with this model.
- 3 to 6 months in a freezer that is part of a refrigerator unit but has a separate door.
- 6 to 12 months in a separate, 0°F (-18°C) "deep" freezer.

Transporting refrigerated or frozen breastmilk

Place it in an insulated bag or cooler with a cool pack. The farther you live from the NICU, the more likely it is that you will have to pad the inside of the cooler with extra cold packs to keep frozen milk from thawing.

Fresh breastmilk

Fresh breastmilk contains the most active anti-infective properties. Refrigerated breastmilk has fewer anti-infective properties than fresh milk and frozen breastmilk has the least.

Thawing breastmilk

The following are general guidelines for thawing frozen milk:

- The oldest milk should be used first, unless recently expressed milk is recommended.
- Thaw breastmilk by placing the collection container in the refrigerator. If you need the milk more quickly, you can hold it under warm running water or place it in a cup, pot, bowl, or basin of warm water.
- Don't thaw breastmilk at room temperature, in very hot water, or in the microwave. Microwaving can create hot spots. Both microwaving and heating in very hot water may decrease the amount of certain anti-infective properties in the milk.
- Your milk separates during storage and the cream rises to the top. Gently swirl, or rotate, the collection bottle of milk to mix it together. Avoid vigorous shaking.

- Don't refreeze milk once it has been thawed. Thawed milk must be used within 24 hours for a baby in the NICU. (It is safe to give milk that has been thawed for 24 to 48 hours after the baby is home.)

Taking care of your breast pump and collection kit

- It is important to maintain the breast pump and collection kit in good working order:
- Read the instruction manual and follow the recommendations for cleaning pump equipment, unless given special guidelines by the NICU.
- The pieces of the collection kit come apart for individual cleaning.
- The pump itself and the tubing portion of the kit do not have to be cleaned, and they should remain dry or they will not work appropriately. (These pieces of equipment never come in contact with milk that is to be stored for the baby.)
- After each use, rinse all parts that come in contact with the breast or milk in cool water first. (A cool rinse removes residual milk without coagulating hard-to-clean protein.) Then thoroughly clean these same parts in hot, soapy water. Rinse in hot water, and air dry between each use.
- Most manufacturers recommend boiling or sterilizing all parts that come in contact with the breast or milk once a day. Sterilizing can be done in the microwave in reusable sterilization bags made by the pump company. (Check the instruction manual.)
- Don't use a dishwasher to clean or sterilize the parts that come in contact with the breast or milk unless you have received permission from the NICU and the instruction manual suggests this method as an option.

Self-Check -2	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is the importance Colostrum label ?
2. steps of colostrum labeling?

Note: **Satisfactory rating - 10 points** **Unsatisfactory - below 10 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

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Operation Sheet 1	Filtering coloustrum

Techniques of performing Filtering coloustrum

Step1. Collect colostrum

Step2. Refrigerating coloustrum

Step3. Freezing coloustrum

Step4. Filtering coloustrum

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within --- hour.

Task 1. Filtering Colostrum

References

Marshall, R.T. (1992) Standard Methods for the determination of Dairy Products. 16th ed. Publ. American Public Health Association.

Richardson, G.H. (1985) Standard Methods for the examination Dairy Products 15th edition, American Public Health Association, Washington

Smith, P. W. 1981. “Milk Pasteurization” *Fact Sheet Number 57*, U.S. Department of Agriculture Research Service, Washington, D.C.

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