TEST YOUR COLOSTRUM MANAGEMENT

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This fact sheet is the final in a series explaining proper colostrum management techniques. The objective of this publication is to provide suggestions on how to determine if calves adequately absorbed colostrum.

FINAL STEP: EVALUATE COLOSTRUM MANAGEMENT PRACTICES

From the previous three fact sheets, we know colostrum absorption is key for calf protection until the calf's immune system develops. If proper cow management practices are in place (proper nutrition during the dry period, clean calving areas and low stress), but colostrum is not managed correctly beyond the cow side, colostrum quality can diminish. Testing to ensure passive transfer of colostrum antibodies has occurred is an indicator of colostrum management success.

WHAT IS PASSIVE IMMUNITY?

- Initial calf immune status is termed **passive transfer**.
  - **Successful passive transfer** means that adequate antibodies were absorbed by the calf.
  - **Failure of passive transfer** means that not enough antibodies were absorbed by the calf.
- Determine passive transfer of antibodies by collecting a blood sample and then measuring **serum total proteins**, or STP.
  - STP is highly correlated with the amount of antibodies in the blood (IgG).
  - A STP less than or equal to 5.0 g/dL suggests little to no transfer of antibodies.
  - Successful transfer is determined at 5.2 g/dL STP.
  - A STP greater than or equal to 5.5 g/dL is effective passive transfer.
- The University of Wisconsin suggests successful colostrum management is indicated by 90 percent of calves having a STP of 5.2 g/dL, and 80 percent of calves having a 5.5 g/dL.
- If using a Brix refractometer, a reading greater than 8.3 percent is sufficient for successful passive transfer.
- Calf STP levels should be measured no later than 7 days old.
  - Do not test STP before 18 hours of age.
  - Preferably, measure STP at 2 or 3 days old.

OUTCOMES OF PASSIVE TRANSFER FAILURE

Calves with a passive transfer failure are more susceptible to septicemia, diarrhea, respiratory diseases, naval infections and joint ill. The University of Florida has found that there is a negative effect on weight gain and stature in calves with poor colostrum absorption.

CAUSES OF PASSIVE TRANSFER FAILURE

- Dry cow management.
    - Dry period length less than 30 days.
    - Cow leaking colostrum from teats.
    - Inadequate vaccine and nutritional management.
    - Unsanitary calving area.
- Delayed collection.
    - Calving and milking interval greater than 4 hours.
- Poor-quality colostrum.
- Inadequate storage of colostrum.
    - Left in refrigerator longer than 24 hours.
        - Colostrum begins to lose quality after 24 hours in refrigeration.
    - Improper thawing from freezer.
        - Frozen colostrum can maintain quality from 6 months to 1 year after collection.
- Colostrum not fed quickly enough to calf.
    - More than 6 hours before first feeding of colostrum.
- Inadequate volume fed to calves.
    - Less than 4 quarts by 24 hours of age.
    - Calves received colostrum containing less than 50 mg/mL of antibodies.

TOOLS NEEDED TO MEASURE PASSIVE TRANSFER

Collect serum from calves between 2 and 7 days old to evaluate passive transfer. Separate serum from the blood to measure serum antibodies. According to Michigan State Extension, measuring STP of 10 calves per quarter is sufficient to determine success of colostrum management.

Resources needed to evaluate STP:

- Alcohol and gauze.
    - Clean the area on the calf's neck with alcohol prior to sticking with needles.
    - Use clean needles/syringes/tubes each time of collection.
- Vacutainer needles or 5 mL syringes with 18 x 1 or 20 x 1 needles.
    - If using 5 mL syringe and needle, inject blood into red top tubes after collection.
    - Blood tubes.
        - Purchase red top blood tubes without anticoagulant (allows clotting).
        - Red top tubes are typically used with either vacutainers or needle and syringe.
        - Collect blood in a 5 mL tube from the jugular vein or tail vein.
            - Jugular veins are typically easier to find relative to tail veins.
    - After blood has filled the tube, pull out the tube and needle.
    - Apply pressure to calf's neck to stop bleeding.
- Storage rack.
    - Blood placed on storage racks should be out of sunlight and at room temperature.
    - If a centrifuge is not available to separate blood and serum, blood samples can sit on a storage rack for 24 hours.
        - After 24 hours, serum can be collected (yellowish liquid on top of blood clot) to test STP. Use a clean plastic pipette to collect serum.
        - Protein concentrations are stable in blood for 5 to 7 days.

Photo 1*. Blood collected from the jugular vein of a calf to determine STP. Blood flow will stop when tube is full. Gently remove the needle from the calf's jugular vein after collection, and hold pressure to help clotting. Singing "Happy Birthday" in your head is an easy way to remember how long to hold pressure. Properly dispose of needles when finished.*

- Refractometer, plastic pipettes, and Kimwipes.
    - Purchase the refractometer that best fits your operation.
    - Refractometers will measure serum protein or percent Brix.
        - Serum protein refractometers measure g/dL.
        - Brix refractometers measure percent Brix.
    - Calibrate the refractometer with distilled water prior to each use.
        - Calibration instructions will come with each refractometer kit.
    - Determine the STP levels with a refractometer:
        - After separation in a red top tube, place serum directly onto the refractometer.
        - Only use 2 to 3 drops of serum, and place on the prism (glass area underneath lid) of the refractometer. Close the lid on top of prism (on right in Photo 2).
    - Place refractometer to your eye, point it towards the light, and read STP levels indicated by a horizontal solid line.
        - The numerical value at the solid line is the STP level.
        - Successful passive transfer is a reading of greater than or equal to 5.5 g/dL.
        - If using Brix refractometer, greater than 8.3 percent is considered successful passive transfer.
    - After reading, clean refractometer with lukewarm water and gently wipe with Kimwipes (on left in Photo 2).

Photo 2. On the right, using the refractometer to measure STP and Kimwipes (left) to clean the refractometer. It is best to avoid paper towels to clean refractometers, because they can scratch the prism of the refractometer.

WHERE CAN YOU FIND THESE RESOURCES? HOW MUCH DO THEY COST?

Blood collection (blood tubes, needles) and STP equipment (refractometers, wipes, plastic pipettes) can be found within any animal health company, online purchasing websites, or by your veterinarian.

PRODUCT	$ AMOUNT
VACUTAINER & NEEDLES (BOX OF 48)	~ $14
BLOOD TUBES (BOX OF 100)	~ $21
REFRACTOMETERS	≥ $50
DISPOSABLE KIMWIPES/BOX	~ $11

CONCLUSIONS

- Re-evaluate management practices if passive transfer failure is occurring.
- STP reading of 5.2 g/dL is considered successful passive transfer of antibodies; 5.5 g/dL is suggested for effective immune development.
- Failure of passive transfer is a leading cause of calf disease outbreaks and death rates.

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