 <b>University of British Columbia</b> <b>Centre for Dairy Education</b> <b>and Research</b>	<b>Document Number</b>	<b>SOP-Cow-020</b>
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<b>KETOSIS</b>		

## 1. PURPOSE

- 1.1. This Standard Operating Procedure (SOP) instructs farm workers and students at the UBC Dairy and Education Centre how to identify and treat an animal suffering from ketosis.

## 2. SCOPE

- 2.1. This SOP will describe how to monitor for ketosis and how to treat her if needed. It will also outline why it is important for the animal's welfare to do so.

## 3. RESPONSIBILITY

- 3.1. The Operations Manager is responsible for reviewing and updating this procedure as required.
- 3.2. Farm workers are responsible to recording any observations and treatments in the dairy day book. The Operations Manager is responsible for transferring the entries in the dairy day book to the herd management software.
- 3.3. The Operations Manager is responsible for ensuring staff are trained in recognizing the signs of ketosis.
- 3.4. Experienced farm workers will be responsible for treating any animals with ketosis.


## 4. DEFINITIONS

**Ketosis (acetonemia):** a metabolic disease which can occur in dairy cattle within a few days or weeks of calving brought on when the animal's energy requirements (e.g. from high milk production) are not being met by her feed intake.

Cows have low blood sugar levels and fat is mobilized as an energy source. However, if fat mobilization exceeds the liver's capacity to metabolize it, ketones build-up resulting in ketosis.

## 5. TRAINING

- 5.1. Training will include animal handling, how to drench animals using two different methods, and how to administer IVs.

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## **6. SAFETY PRECAUTIONS**

- 6.1. All personnel entering the cattle holding area will wear personal protective equipment -coveralls, disposable gloves and dedicated facility footwear.
- 6.2. Care will be taken when handling sharps. Needles and syringes will be disposed of in an appropriate sharps container.
- 6.3. Always thoroughly wash hands with soap and water when leaving the barn.

## **7. GENERAL**

- 7.1. Ketosis is typically seen in a fresh cow (<20 DIM).
- 7.2. Ketosis can have significant impacts on an animal's well-being and reproduction.
- 7.3. Ketosis is characterized by a slow decline in milk production, lack of appetite, lethargy, weight loss, and increase in ketone bodies in the milk, blood and urine. A reduction in volume of manure along with an increase in thickness is usually seen.
- 7.4. Any animal showing the above symptoms should be monitored for ketosis until her condition improves.
- 7.5. The Keto-Test is used to monitor select animals at the UBC Dairy for ketosis. The Keto-Test is a semi-quantitative colourimetric test that measures the level of beta-hydroxybutyric acid (BHBA), a ketone body, in milk. The concentration of BHBA present in the milk can be estimated by the strength of the colour change on the dip strip. The deeper the pink/purple colour, the higher the concentration of ketones in the milk, and the greater the likelihood of ketosis.
- 7.6. Record any observations, test results and treatments in the dairy day book.

## **8. MATERIALS AND EQUIPMENT**

- 8.1. Elanco Keto-Test – milk dip test. Stored in refrigerator in the vet room


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Fig 1. Keto-test

- 8.2. Drench mate apparatus
- 8.3. Drenchmate powder-see SOP on Administering Oral Medications
- 8.4. Dextrose 50% - see SOP on Giving Injections
- 8.5. Needle – 14 gauge, 2”
- 8.6. Rubber IV tubing
- 8.7. 4x4” sterile gauze
- 8.8. 70% isopropanol
- 8.9. Propylene Glycol (Glycol-P) – see SOP on Administering Oral Medications




Fig 2. Propylene glycol and drenching gun


- 8.10. Drenching gun – 300 ml capacity

## PROCEDURE

- 8.11. Any animal not doing well, or suspected of having ketosis should be monitored for elevated ketones by checking her milk using the Keto-Test strips. Record results in the Dairy day book, to be entered into the herd management software.
  - 8.11.1. How to use the Keto Test:

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- 8.11.1.1. Prep the animal for milking (See SOP on Milking Procedures). Animals can also be tested while in their pen if a quick check is required between milkings.
- 8.11.1.2. Before attaching the milking unit, wet the indicator end of the strip for 3 seconds with a drop of milk. Shake off the milk, and after one minute compare the colour of the Keto-test strip to the colour chart on the bottle label.
- 8.11.1.3. A normal concentration of milk ketones is 0-50  $\mu\text{mol/L}$ . Any result  $\geq 100 \mu\text{mol/L}$ , indicated by the strip turning pink, indicates that the animal has ketosis. The darker the shade, the more ketones in her milk.
- 8.11.1.4. After milking, divert animals positive for ketosis to a pen equipped with headlocks for treatment. See the SOPs on Moving and Chasing Cattle, and Handling Cattle for instructions on moving and headlocking cattle.
- 8.11.1.5. Evaluate animals with ketosis for any underlying issues which may be present– take her temperature, check for signs of displaced abomasum, manure consistency, and hydration. If you have any concerns, contact a Sr. Farm Worker.
- 8.11.1.6. Treat any mild cases of ketosis (100-200  $\mu\text{mol/L}$ ) by giving the animals 300 mls of Glycol P with the drenching gun. Repeat treatment 1x/d for an additional 3 days. See SOP on Administering Oral Medications. Reevaluate animal each day.
- 8.11.1.7. Treat moderate cases of ketosis (200-500  $\mu\text{mol/L}$ ) by drenching the animal with a combination of 1.5 lbs of Drenchmate powder dissolved in 40L warm water and 300 mls of Glycol-P. Using the drenching gun, give 300 mls of Glycol-P for an additional 3 days. Reevaluate animal each day.
- 8.11.1.8. Place any severe cases of ketosis, indicated by the Keto-Test strip turning purple within 60 seconds, on the treatment protocol (Table 1) below. Daily reevaluate animal, and monitor for ketones using the Keto-test as per Table 1. Retest for milk ketones on Day 4 and consult the veterinarian if results are still high.

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8.12. Table 1. Treatment Plan for **Severe** Cases of Ketosis

<b>DAY</b>	<b>DRUG NAME</b>	<b>DOSAGE</b>	<b>ROUTE</b>	<b>FREQUENCY</b>
1	Dextrose, 50%	500 mls	IV	Once
1	Drenchmate powder	1.5 lbs in 40L warm water	Orally	Once
1	Glycol-P	300cc	Orally	1x/day
2	Glycol-P	300cc	Orally	1x/day
3	Glycol-P	300cc	Orally	1x/day
4	Glycol-P	300cc	Orally	1x/day
4	Recheck for milk ketones using Keto-Test strip			
If Keto-test strip turns purple within 60 seconds, <b>repeat Day 1-4</b> treatment protocol. Continue reevaluating animal (checking for other causes) and giving Glycol-P until milk strip is NORMAL.				
4	<b>If the animal is still ketotic after 4 days, Farm Worker II or Operations Manager to consult herd veterinarian</b>			
Withdrawal times after last treatment: Milk: 0 hr ; Meat: 0 days				

8.13. If the animal's condition is not improving, check for Left and Right Displaced Abomasum (LDA, RDA). See SOP on Displaced Abomasum


8.14. Leave any severely ketotic animals in the hospital pen for a few days and offer fresh TMR, hay and water ad libitum. Closely monitor feed intake and milk production to ensure her condition is improving.

8.15. Wash hands thoroughly with hot water and soap when leaving barn.

8.16. Record all treatments in the dairy day book.

## 9. REFERENCES

9.1. CCAC Guidelines on the Care and Use of Farm Animals in Research, Teaching and Testing. CCAC. 2009

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- 9.2. Code of Practice for the Care and Use of Dairy Cattle. National Farm Animal Care Council. 2009.
- 9.3. Merck Manual. Veterinary Manual. Overview of Ketosis in Cattle.  
<https://www.merckvetmanual.com/metabolic-disorders/ketosis-in-cattle/overview-of-ketosis-in-cattle>. Accessed Nov 12, 2019.

## 10. RELATED SOPS AND FORMS

- 10.1. SOP-General-001 Student Training
- 10.2. SOP-Cow-006 Moving and Chasing Cattle
- 10.3. SOP-Cow-012 Giving Injections: Subcutaneous, Intramuscular and Intravenous
- 10.4. SOP-Cow-014 Administering Oral Medications
- 10.5. SOP-Cow-016 Milking Procedures
- 10.6. SOP-Cow-018 Displaced Abomasum
- 10.7. SOP-Cow-023 Handling Cattle

## 11. APPROVAL AND REVISION HISTORY

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