KETOSIS IN GOATS

VETERINARY SCIENCE

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LEVEL 3

SADDLE & SPURS 4H CLUB

KETOSIS IN GOATS

OVERVIEW

MAMAS STORY

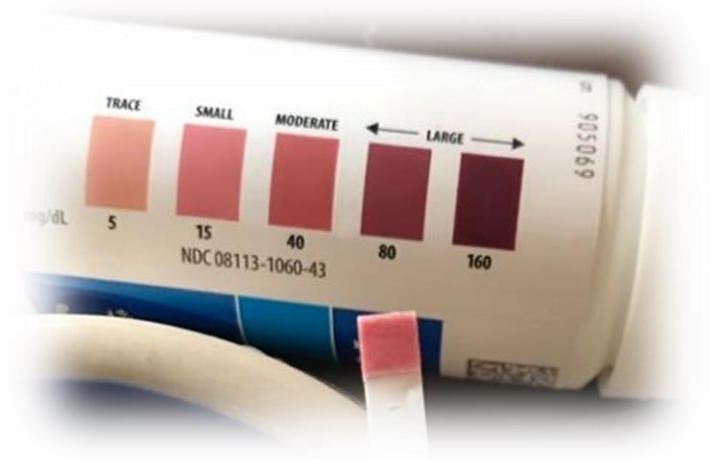
LEARNINGS

WHAT IS KETOSIS?

- Ketosis is a metabolic condition also called pregnancy toxemia. It occurs at the end of gestation and lactational Ketosis occurs during early lactation. The central metabolic event is fat mobilization from body stores to maintain normal blood glucose levels during times of high energy demands. The disease in late gestation female goats (does) is classified by multiple fetuses, obese or extremely thin does due to an inability to respond to the increased metabolic demand for energy in the mother. The doe is unable to obtain enough energy, and toxic ketones accumulate in the blood due to the fat metabolism process.

MAMAS STORY

- With seventeen (17) days remaining to delivery, I noticed Mama (my 3-year-old Boer doe) laying down more than normal and she was not cleaning up her food like she typically does. Based on some previous experiences, I checked her legs for swelling and tried to smell her breath.
- I noticed a sweet smell to her breath and that her front legs were showing signs of swelling.
- Immediately I took her temperature and tested her ketones.



Ketones are chemicals the liver makes. They produce when there is not enough insulin in the body to turn sugar (or glucose) into energy. Another source is needed, so the body uses fat instead. The liver turns this fat into ketones, a type of acid, and sends them into the bloodstream. Muscles and other tissues can then use them for fuel. The build up too many ketones in your blood can become life-threatening. Goats having blood ketone level more than 0.4 mmol/l are considered positive for sub-clinical Ketosis.

MAMAS STORY, cont.

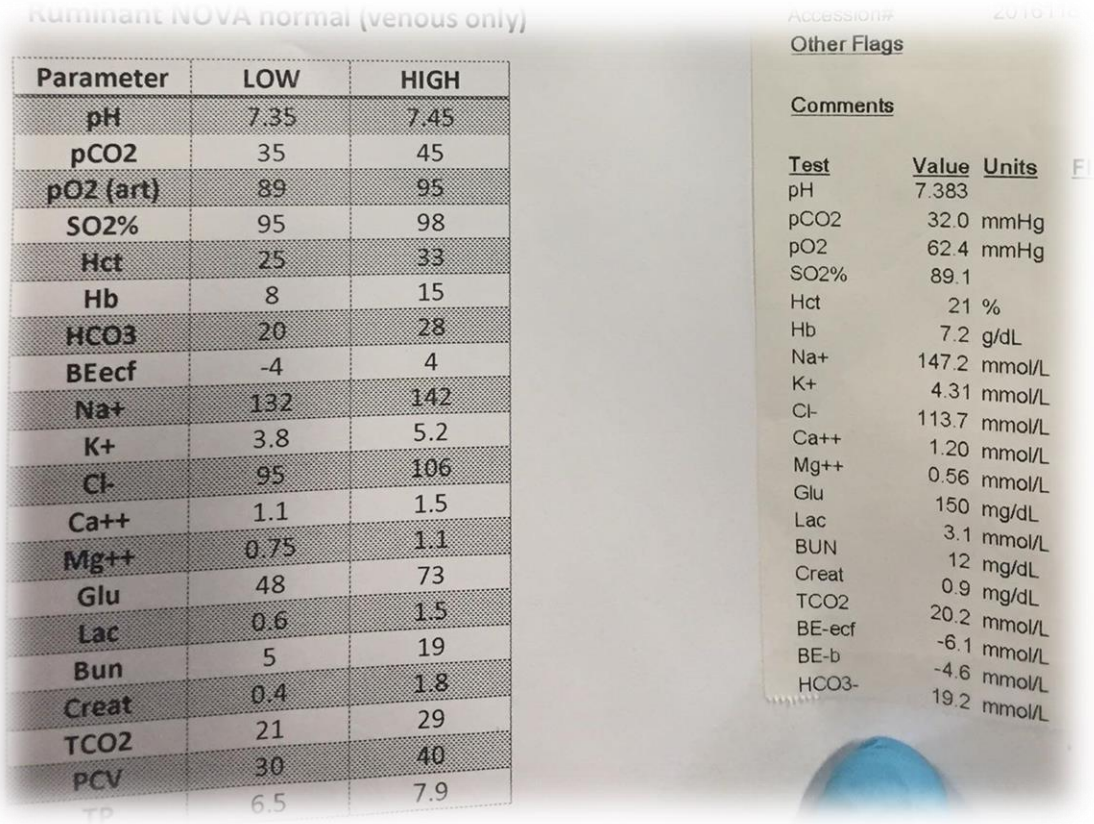
- Based on Mamas test results, I contacted my Veterinarian. Her suggestion was to start giving Mama propylene glycol in order to increase her blood sugar and give her energy to want to eat and get active.
- From experience, I had learned that too much propylene glycol can be harmful to my animals. With Mama being so far from delivery, I made the decision to go with a common home remedy to try and bring the ketones down.
- Special Recipe
  - Calcium Gluconate - 60 cc 3x per day orally to increase calcium.
  - Milk shake - 3 cup milk 1/3 cup cream 1 egg dash of vanilla. Can add few tablespoons baby rice cereal. This is used to increase caloric intake and increase energy and desire to eat.
  - Molasses mix. 2-1 Karo syrup r to molasses mix example 1 cup Karo 1/2 cup molasses. 1/4 cup corn oil. Add just enough water it can be drawn up in drench gun. 60 cc 2-3 x per day. This is used to increase sugar and energy supply. Molasses kicks up carbohydrate intake which helps get the doe out of or keep them from going into Ketosis
  - 1x shot of LA200, this is used to prevent infection and enhance calcium absorption.
  - Banamine, this is used to assist with pain.
  - B complex 1x per day, this treats B vitamin deficiencies and provides supplemental B vitamins. B complex helps appetite. B complex deficiency can lead to poliomyelitis in goats and any digestive upset can disrupt vitamin b production.
  - If no improvement, start on dexamethasone 1 cc 1x per day or steroid called pre-def. This, in small amounts will not abort the goat kids but will help the lungs of premature kids. Because they are premature, their lungs do not convert oxygen like fully developed kids.
  - Steamed corn as a quick source of sugar and enough food left out so there is always some should they become interested.

MAMAS STORY, cont.

- After seeing positive test results for five (5) days, Mama took a turn for the worst and the treatment was no longer working. It was at this time, we decided to take her to the Veterinary Hospital.

MAMAS STORY, cont.

- Upon arriving at the Veterinary Hospital, Mama was weighed, her temperature was taken, and her blood was drawn to determine her overall health. It was determined that she was reaching the point of dehydration and was on the low end of Ketosis.



Ruminant NOVA normal (venous only)

Parameter	LOW	HIGH
pH	7.35	7.45
pCO2	35	45
pO2 (art)	89	95
SO2%	95	98
Hct	25	33
Hb	8	15
HCO3	20	28
BEecf	-4	4
Na+	132	142
K+	3.8	5.2
Cl-	95	106
Ca++	1.1	1.5
Mg++	0.75	1.1
Glu	48	73
Lac	0.6	1.5
Bun	5	19
Creat	0.4	1.8
TCO2	21	29
PCV	30	40
TP	6.5	7.9

Accession#

Other Flags

Comments

Test	Value	Units
pH	7.383	
pCO2	32.0	mmHg
pO2	62.4	mmHg
SO2%	89.1	
Hct	21	%
Hb	7.2	g/dL
Na+	147.2	mmol/L
K+	4.31	mmol/L
Cl-	113.7	mmol/L
Ca++	1.20	mmol/L
Mg++	0.56	mmol/L
Glu	150	mg/dL
Lac	3.1	mmol/L
BUN	12	mg/dL
Creat	0.9	mg/dL
TCO2	20.2	mmol/L
BE-ecf	-6.1	mmol/L
BE-b	-4.6	mmol/L
HCO3-	19.2	mmol/L

MAMAS STORY, cont.

- Since Mama's due date was so far out, the Veterinarian decided to use an IV to give her the fluids her body needed more quickly. The main fluid given was veterinary lactated ringer's Injection, USP. This is a sterile, nonpyrogenic solution containing isotonic concentration of electrolytes in water for injection. The solution is isotonic. It is administered by intravenous infusion for parenteral replacement of extracellular losses of fluid and electrolytes.
  - Each 100 mL of Veterinary Lactated Ringer's Injection, USP contains sodium chloride 600 mg, sodium lactate, anhydrous 310 mg, potassium chloride 30 mg and calcium chloride, dihydrate 20 mg. May contain hydrochloric acid and/or sodium hydroxide for pH adjustment. A liter provides 9 calories (from lactate), sodium (Na^+), 130 mEq, potassium (K^+) 4 mEq, calcium (Ca^{++}) 3 mEq, chloride (Cl^-) 109 mEq and lactate [$CH_3CH(OH)\ COO^-$] 28 mEq. The electrolyte content is isotonic (273 mOsmol/liter, calc.) in relation to the extracellular fluid (approx. 280 mOsmol/liter). The pH of the solution is 6.6 (6.0 to 7.5)

MAMAS STORY, cont.

- After four (4) days of intense treatment, it was determined that Mama would need to have her labor induced in order to save her. We knew that this was where we were making the choice to save Mama or to risk her life for her babies. We chose to save Mama.
- Mama was given several ruminal fluid transfers. In situations of prolonged inappetence, the rumen microflora may be seriously depleted and rumen fluid transfer should be considered. The microflora in the rumen juice donated from a healthy animal may allow fermentation to resume in the microbe depleted rumen of a recipient animal. Rumen fluid transfer has been demonstrated to be an effective treatment for in appetent ruminants. I truly believe this was key to keeping Mama alive throughout this hard time as she was not eating feed or hay.
- After being induced, we waited 48 hours and her labor was not progressing. Mama needed a C Section. Unfortunately, only one of the four (4) goat kids survived, and he passed away two (2) days later.

MAMAS STORY, conclusion

- Mama, against the odds, has made a full recovery and should be able to have babies next spring. Mama is doing great and has taught me so many lessons.

LEARNINGS

Signs & Symptoms

- Signs of Ketosis include depression, lack of appetite and decrease in milk production if lactating. The goat's breath will have a sweet smell, which some humans can detect. Urine tests with ketone strips will be positive for ketone bodies. Fecal output is reduced to a few small, dry pellets. Other signs can include teeth grinding, dull eyes, recumbency, blindness, star gazing, tremors, coma and death.

Prevention

- Prevent obesity in pregnant does. Gradually increase the energy content of the ration in the last 6 weeks of pregnancy. Provide good sanitation, ventilation, and proper exercise. Allow does free exercise for two to three hours per day. Early diagnosis of pregnancy and selective feeding of dams with multiple fetuses to maintain adequate body condition score (BCS) is important. Conduct regular BCS of the herd. Avoid excessive weight loss during pregnancy and improve BCS of thin does. Early recognition of clinical signs is key to successful intervention.

LEARNINGS

Treatment

- Treatment consists of increasing the energy density of the diet. This can be accomplished by feeding good-quality roughage and increased concentrate in early stages. Administer propylene glycol or Ketoplus two to three times per day. Propylene glycol may be toxic at high and repeated doses. Limit to 60cc/dose in a dam that is eating and discontinue if she goes off feed. Supplement with a mixture of sodium bicarbonate given twice daily. Alternative treatment may consist of Calf Pac/Probios mixed with 100cc Revive (one bottle 50% dextrose, 20cc B-complex, 5cc B-12, 2cc 500 mg/ml thiamine), and 100cc of water. Corn, molasses, sweet feed and/or corn syrup can also be administered to increase caloric intake.
- If there is no response to treatment within 24 hours, a veterinarian should be contacted for more aggressive treatment. Aggressive treatment consists of inducing labor or delivery of kids via C-section; the kids are often non-viable, but this may be the only treatment of choice for saving the dam. Force feeding and maintaining appetite are critical. Snatching a cud from healthy goats to feed to sick goats can be useful. Boer goats may be predisposed to this condition.

CONCLUSION

Future Care

- It was determined that Mama was not overweight but since she had four (3) kids that were over five (5) pounds each, her body just could not keep up with the demands of the babies. In the future, I will have my bigger does ultra-sounded in their last 45 days in order to determine how many kids they are carrying and work closely with my Veterinarian to determine the best nutrition in order to prevent future Ketosis.
- I had another doe who had Ketosis but did deliver the kids on her own. We were able to save a doe and a buck. The doe was very weak and had a low temperature, so we had to keep her in the house and bottle feed her. One hard lesson that I learned was that after giving birth with Ketosis, does are very weak. This doe was so weak that she tried to nurse her son but fell on him and was not able to get up fast enough, leading to his death. In the future, I will make a separate area for kids to lay down and stay warm away from their mothers to prevent this.

Exhausted and weak doe after Ketosis delivery.

REFERENCES

- Childress, Gayla
  - Interview with long-time goat herder
- Radloff, Chris DVM
  - Veterinarian & long-time goat herder
- Mary C. Smith & David Sherman: Goat Medicine