## Rumen Function Test

The analysis of rumen fluid is carried out to assess.

1- Diagnosis of ruminal diseases
2- Evaluation of ruminal fluid before use in therapeutic transfusion

**Basic Anatomy and Physiology Refresher:**

It is important to have a working knowledge of the ruminant digestive tract when attempting sampling of rumen fluid. The ruminant digestive system is made up of four compartments: rumen, reticulum, omasum and abomasum with each section being responsible for specific digestive functions. The "forestomach" contains the rumen, reticulum and omasum while the abomasum is regarded as the "true stomach".

| section | Function |
|---|---|
| Rumen | Mixing /churning digesta |
| Reticulum | **Mixing/ distribution anaerobic bacteria** |
| Omasum | **Absorbed water and salts** |
| Abomasums | **Secreted enzymes for digestive breakdown** |

**Methods of collection:**

There are two methods of rumen fluid collection:

1- Ororuminal collection: it is often favored when small amounts of fluid must be collected and may be attempted by a veterinary technician due to the ease of the procedure (used stomach tube).
2- Ruminocentesis (needle puncture of rumen) by contrast, yields larger amounts of fluid and lacks the salivary contamination

sometimes experienced with orogastric collection. The negative aspect of ruminocentesis is the measure of difficulty in locating rumen and the chance of post operative infection of the puncture site.

***Examination of Rumen fluid***

**A- Physical examination**

1- **Color:** Color of the rumen content fluid depends up on the type of the feed.

| Color | Evaluation |
|---|---|
| **Yellow/Brown** | Corn silage/straw diet |
| **Brown/Olive** | Concentrate diet |
| Green | Pasture Diet |
| **Milky gray/Brown** | Lactic Acidosis |

Abnormally it may be greenish black in decomposition.

2- **Odor:**

• Under normal condition the odor of the rumen is aromatic odor and non replant.

| Odor | Evaluation |
|---|---|
| **Aromatic** | Normal |
| **Acidic/sour** | Lactic Acidosis |
| Rotting | Rumen Putrification/Infection |
| Ammonia | Urea poising |

3- **Consistency:** It is slightly viscous under normal condition.

| Consistency | Evaluation |
|---|---|
| **Excess viscosity** | High saliva content |
| **Watery, few particles** | Lactic Acidosis |
| Bubbles | Bloat/ vagus indigestion |

4- **Sedimentation Activity Time**

**Procedure**

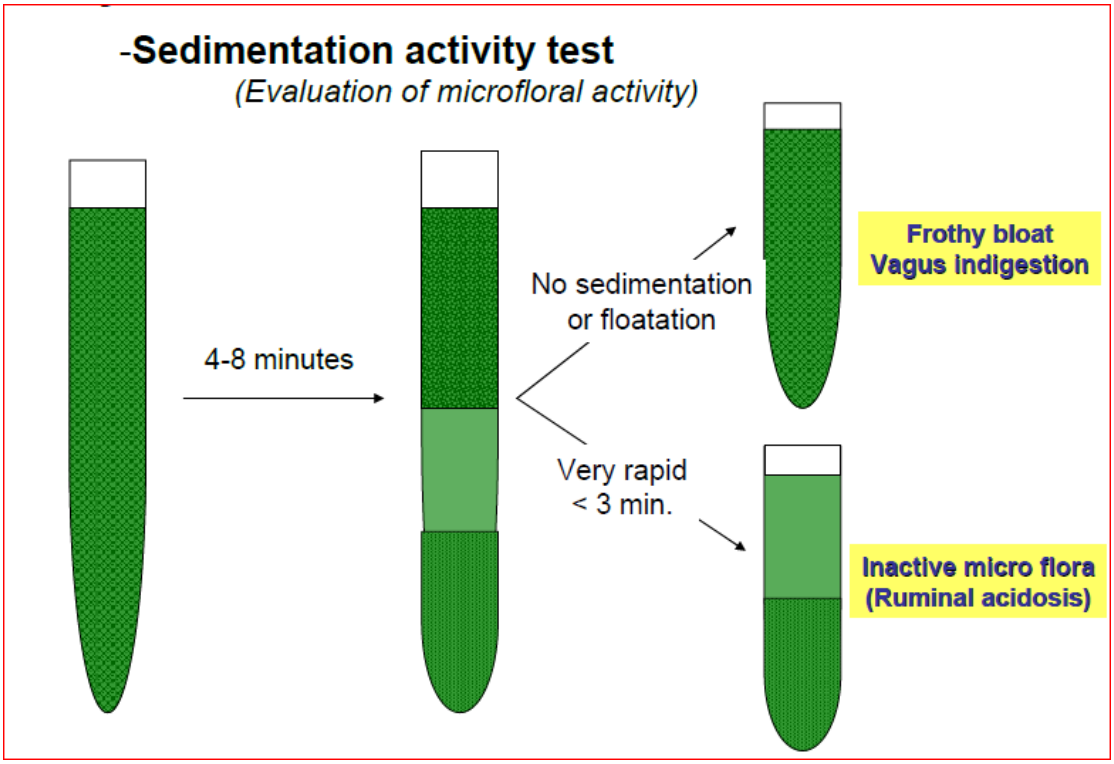
• Directly use rumen fluid or filter the fluid allow to stand for a few minutes

• The fine particles and infusoria settle down while floatation flows due to the production of gas by micro flora of rumen.

The time required for the setting down of infusoria and fine particles and floating of the production of gas by the microorganisms is known as the sedimentation activity time.

Under normal condition the SAT will be very weak floatation, slow or absent due to the absent of active microorganism, example in starvation.

In acidosis Lactobaccili are very active and there is large amount of gas production and floatation are very quick and large.




***B- Chemical character***

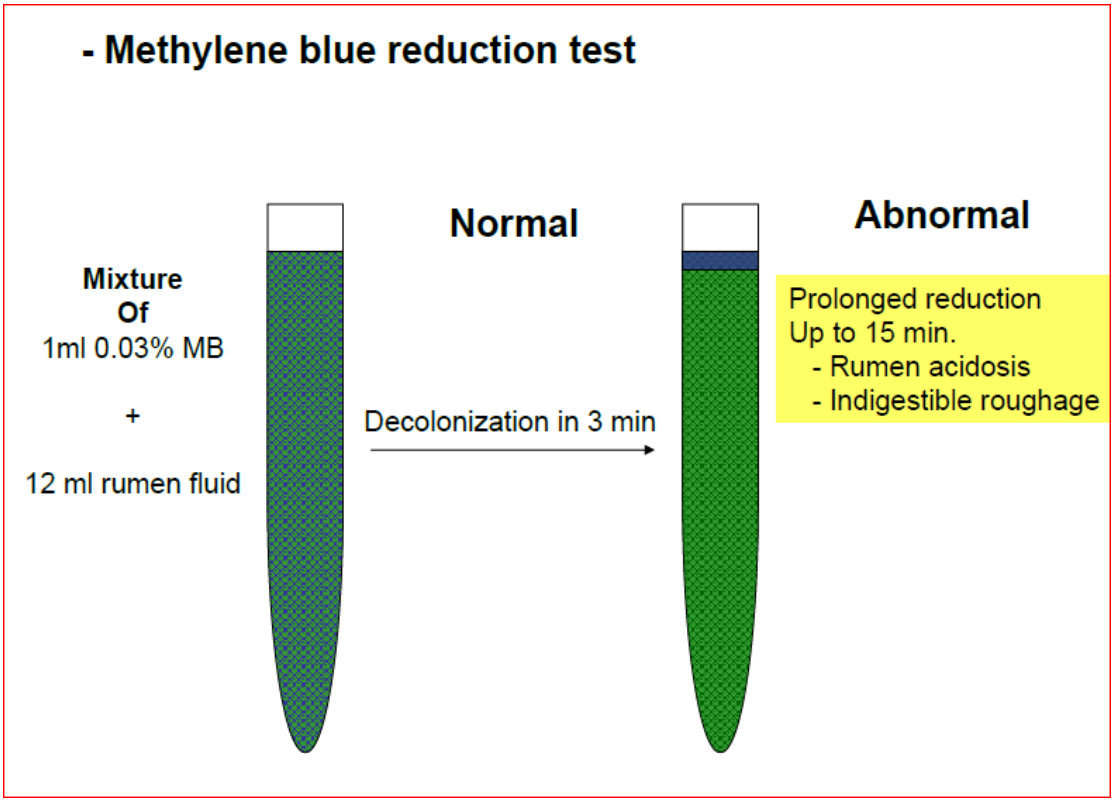
**1- Total acidity (pH) of rumen contents**

The pH of the rumen fluid varies from 6– 7 which may be affected by saliva which contains bicarbonate.

1- 8 and above Saliva contamination, putrification
2- 7-8 Reduced feed intake
3- 6-7 Normal pH of cattle
4- 5 – 5.6 High grain diet or pasture fed/early Lactic Acidosis
5- 5.5 Lactic Acidosis

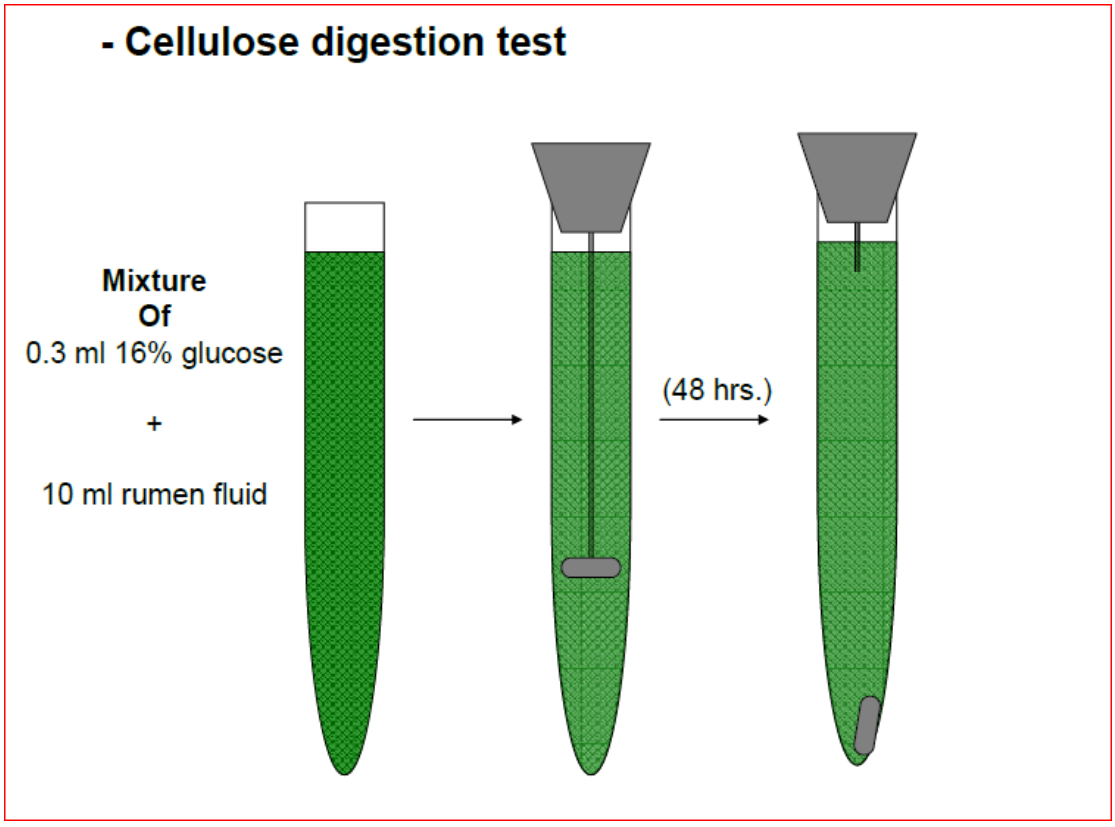
**2- Methylene blue reduction test.**

**Used for indication anaerobic fermentation.**



**3-Cellulose digestion test.**

**Used for detection digestion of fibers**.




**4- Glucose fermentation test**

0.5 ml of 16% glucose + 10 ml. of rumen fluid Place the mixture in a fermentation saccharometer Keep the saccharometerat 39°C Read the results after 30 –60 min.

The test measure indirectly the ability of ruminal flora to ferment glucose through measuring the volume of formed gas

Normal microflora (1-2 ml gas production / 1hour)

Inactive microflra (little or no gas formation)

**5-Nitrate reduction test**

**Used for detection digestion of protein**

**7-Rumen fluid chloride**

-Measured in a supernatant of a centrifuged sample

-Measured by chloride meter.

-Normal level is ; 30 mEq/l

-***Elevated level :***

1- Abomasal disease.

2- Abomasal reflux.

3- Obstruction of intestinal flow

**Microscopic examination**

**Purpose:** To determine the dominate bacteria in the ruminal fluid

**1- Qualitative method**

**Motility of ruminal microfauna**

-Prepare a fresh film.

-Examine by low power.

-The activity of the fauna is judged as follow:

Motility Activity-

Highly motile and very crowded- +++

Motile and crowded ++

Sluggish motility and low numbers- +

No or sporadic alive fauna 0

**2- Quantitative method**

-Mix 1 ml of strained rumen fluid with 15 ml of saline and 5 ml of lugol'siodine.

-Spread 0.1 ml of the mixture on glass slide.

Count in 30 fields.

-The average = protozoal count in 1square ml

-The average X 1100 (22x50) = protozoal count in 0.1 ml of diluted rumen fluid

-This number = protozoal count in 0.02 ml. of original sample

-protozoal count /ml = previous number x 50

**Method:** Gram stain

**Materials:** Gram staining dyes (GV, iodine, safranin, methanol or acetone), slide, microscope

• Under normal condition gram negative bacteria are the dominate

• In the rumen of the animals feed on roughage, the large streptococci kidney shaped cocci, saracia are predominantly present

• Under acidosis condition Gram positive bacteria predominantly present