Ruminal fluid examination
Indication of Ruminal fluid examination

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

Methods of collection:

- Needle puncture of the rumen
- Oral or nasal passage of stomach tube
General precaution for rumen fluid examination:

- Samples should be evaluated directly after collection to minimize effects of cooling and air exposure on protozoal activity.

- Transportation of ruminal fluid for long distance must be done in double jacket container.

- Estimation of chloride and ammonia conc. can be delayed up to 9 hrs. in room temp. and up to 24 hrs. in refrigerator.
Examination of ruminal fluid

**Physical characters**
- Color
- Consistency
- Odor
- Sedimentation activity test

**Chemical characters**
- pH
- Cellulose digestion test
- Glucose fermentation test
- Nitrate reduction test
- Rumen fluid chloride

**Microscopical exam.**
- Quantitative exam.
- Qualitative exam.
Physical characters

-Color

Normal: Olive to brownish green (hay ration)
    Deeper green color (green ration)
    Yellowish brown color (grain or silage ration)

Abnormal: Milky grey (grain overfeeding)
    Darker greenish (ruminal stasis/decomposition)
    Grey with clots of milk (calves with abomasal reflux)
Physical characters

- Consistency

  Normal: Slightly viscous

  Abnormal: Watery (Inactive bacteria or protozoa)
  Excess frothy (Frothy bloat/ vagus indigestion)

- Odor

  Normal: Aromatic odor

  Abnormal: Ammonia smell (Urea poisoning)
  Moldy rotting (protein putrefaction)
  Sour odor (excess lactic acid/grain overfeeding)
Physical characters

-Sedimentation activity test
(Evaluation of microfloral activity)

- 4-8 minutes
  - 4-8 minutes
  - Very rapid < 3 min.
  - No sedimentation or floatation

Frothy bloat
Vagus indigestion

Inactive micro flora
(Ruminal acidosis)
Chemical characters

- ruminal fluid pH

Normal: ranged between 5.5 – 6.5 (grain feeders) and 6 – 7 (green fodders)

Abnormal:

Elevated pH (Rumen alkalosis)
- Simple indigestion
- Urea indigestion
- Putrefaction of ruminal content

Lowered pH (Rumen acidosis)
- Grain overfeeding
- chronic ruminal acidosis
Nitrate reduction test

Digestion of fibers

Digestion of carbohydrates

Digestion of protein

Anaerobic fermentation

Cellulose digestion test

Glucose fermentation test

Methylene blue reduction test

Nitrate reduction test
- Methylene blue reduction test

**Mixture Of**

1 ml 0.03% MB + 12 ml rumen fluid

Decolonization in 3 min

**Normal**

**Abnormal**

Prolonged reduction Up to 15 min.
- Rumen acidosis
- Indigestible roughage
- Cellulose digestion test

Mixture
Of
0.3 ml 16% glucose
+
10 ml rumen fluid

(48 hrs.)
- **Glucose fermentation test**

0.5 ml of 16% glucose + 10 ml of rumen fluid

Place the mixture in a fermentation saccharometer

Keep the saccharometer at 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 / 1 hour)

Inactive microflora
(little or no gas formation)
- Nitrate reduction test

- Rumen fluid chloride
  - Measured in a supernatant of a centrifuged sample
  - Measured by chloride meter.
  - Normal level is 30 mEq/l
  - Elevated level:
    * Abomasal disease.
    * Abomasal reflux.
    * Obstruction of intestinal flow
Microscopical examination

Qualitative method

- Motility of ruminal microfauna

- Prepare a fresh film.
- Examine by low power.
- The activity of the fauna is judged as follow:

<table>
<thead>
<tr>
<th>Motility</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly motile and very crowded</td>
<td>+++</td>
</tr>
<tr>
<td>Motile and crowded</td>
<td>++</td>
</tr>
<tr>
<td>Sluggish motility and low numbers</td>
<td>+</td>
</tr>
<tr>
<td>No or sporadic alive fauna</td>
<td>0</td>
</tr>
</tbody>
</table>
Quantitative method

- Mix 1 ml of strained rumen fluid with 15 ml of saline and 5 ml of lugol’s iodine.
- Spread 0.1 ml of the mixture on glass slide under 0.1 ml of the mixture count using 10X power Field area 1square ml

0.1 ml of the mixture

- 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