Coliform Bacteria Growth Demonstration

Materials required:

- 7 self-closing plastic bags
- supply of ground coffee
- measuring spoons and cups as used for baking
- Or, if you prefer scales that works okay, too. Just double the weight from one bag to the next.

SMALL demo kit (easy to carry in overall pocket)
Use 7 **one-quart** size self-closing plastic bags (e.g., Zip-lock® bags)

Using a permanent black marker first label the bags as shown below starting at 00:00 and ending at 02:00 hours. Then, add the matching amount of ground coffee to each bag.

		Amount of ground coffee for each bag		
		Teaspoons	Tablespoons	1/4cup
Time after milking colostrum				
Start:	00:00 (1st bag)	1		(1 gram)
(20 mins.)	00:20	2		(2gm)
	00:40	1	1	(4gm)
(1 hour)	01:00	2	2	(8gm)
	01:20	1	1	1 (16gm)
	01:40	2	2	2 (32gm)
	02:00 (7th bag)	1	1	5 (64gm total)

LARGE demo kit (big enough for group presentation)
Use 7 **one-gallon** size self-closing plastic bags (e.g., Zip-lock® bags)
Using a permanent black marker first label the bags as shown below. Then, add the matching amount of ground coffee to each bag.

		Amount of ground coffee for each bag		
		Tablespoons	1/4cup	1cup
Time after milking colostrum				
Start:	00:00 (1st bag)	1		(5grams)
(20 mins.)	00:20	2		(10gm)
	00:40	0	1	(20gm)
(1 hour)	01:00	0	2	(40gm)
	01:20	0	0	1 (80gm)
	01:40	0	0	2 (160gm)
	02:00 (7th bag)	0	0	4 (320gm total)

Technical Notes about the demonstration:

- Assumes colostrum temperature in the range of 95-100 degrees. As temperatures fall closer to 60 degrees the time for bacteria population to double increases roughly from 20 to 150 minutes.

- Assumes no additives such as a bactericidal solution (chlorine solution) or growth inhibitor (potassium sorbate).

- Does not take into account the lag phase. Bacteria will take some time to accommodate to the environmental conditions of the colostrum prior to multiplication. To be more accurate, the first twenty or thirty minutes would represent the lag phase during which little or not growth occurs. Then, during the next twenty minutes, the first doubling would occur.

- Implications for enteric health of selected coliform counts

Less than 5,000 cfu/ml – low impact, minor scours problems in less than one-third of the calves.

5,000-20,000 cfu/ml – moderate scours problems in up to three-quarters of the calves, tend to last 7 to 10 days rather than only 2-4 days.

21,000-50,000 – occasional deaths at 3-5 days, usually severe scours between 7 and 21 days in nearly all the calves.

51,000-250,000 – very severe scours problems, enterotoxemia starting to be a problem causing rapid onset of death, bloated calves in 2-6 day range, scours problems that just won't stop up to three weeks of age affecting nearly all calves, respiratory illness frequently a secondary infection.

Over one-quarter million – frequent mortality associated with enterotoxemia, nearly all the calves have severe scours, most of the calves require antibiotic treatment, many require IV or SQ fluids

Technically, all coliforms are not equal when it comes to causing enteric problems. Evidence points at fecal coliforms as the worst problem. The implications above, therefore, have to be interpreted with some caution when other strains are identified.

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