

## Study of K-medium

### Applicability of K-medium on *E. coli* Detection, Comparing with That of Deso-medium

HARUKO NOMURA

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The data on detecting efficiency of *E. coli* on K-medium were compared with those on \*Deso-medium. On K-medium, considerably more *E. coli* colonies were found than on Deso-medium under the same condition. The results suggest the applicability of this new method to estimate the contamination of foods.

#### Introduction

K-medium is a new type of culture media developed by Katsuya and Yamato in 1956.<sup>1)</sup> This organic colloid is made from alkaline silicates, and requires neither heating nor cooling on its turning to a gelatinous form, that is, it can be treated at room temperature. Because of this property, it is considered as more useful medium on studies of bacteriology than Agar-media.

However, very limited attempts have been made to study the applicabilities of this medium. The present paper deals with the application of the K-medium to detection of *Escherichia coli*.

In recent years, \*Deso-medium has been regarded to be useful because of its specific for enterobacteriaceae<sup>2)</sup>, so the comparison was also made between the detectability for *E. coli* of K-medium and that of Deso-medium.

Results obtained were as follows:

#### Experimental

##### a. Composition of culture media

1) K-medium	(in 1000 ml)
	%
Solution 1 {	Na <sub>2</sub> SiO <sub>3</sub> 8
	Meat Extract 0.5
	Peptone 0.5
Solution 2 {	H <sub>3</sub> PO <sub>4</sub> 4
	Arabian Gum 1

The pH of K-medium was adjusted to be  $7.2 \pm 0.2$  by adding Solution 2 into 10 ml of Solution 1.

\* Abbreviation: Desoxycholate-medium

## 2) Deso-medium (Eiken manufacture)

	(in 1000 ml)
	%
Peptone (Eiken)	1
Lactose	1
NaCl	0.5
Ferric Ammonium Citrate	0.2
K <sub>2</sub> HPO <sub>4</sub>	0.2
Neutral Red	0.0033
Desoxycholic Acid Sodium Salt	0.1
Agar (Eiken)	1.5

pH 7.2±0.2

## b. Sample of material

*E. coli*, used as the research material, was kindly offered by Prof. Suganuma, Department of Bacteriology, Kyoto Prefectural University of Medicine. The culture of this bacteria was diluted with isotonic NaCl solution to a certain concentration. Amount of the material should be taken to give colony counts between 30 and 300 on each plate.

**Table 1.** Comparison of K-medium with Deso., and calculation for t-test

Pair No.	Number of <i>E. coli</i>		Difference		Pair No.	Number of <i>E. coli</i>		Difference	
	K-medium	Deso-medium	D	D <sup>2</sup>		K-medium	Deso-medium	D	D <sup>2</sup>
1	830	150	680	462400	31	320	50	270	72900
2	980	120	860	739600	32	460	150	310	96100
3	380	30	350	122500	33	980	210	770	592900
4	60	20	40	1600	34	280	100	180	32400
5	350	260	90	8100	35	430	160	270	72900
6	510	310	200	40000	36	360	220	140	19600
7	370	70	300	90000	37	570	80	490	240100
8	450	110	340	115600	38	930	250	680	462400
9	70	30	40	1600	39	180	40	140	19600
10	50	40	10	100	40	520	80	440	193600
11	620	290	330	108900	41	100	10	90	8100
12	540	240	300	90000	42	540	40	500	250000
13	620	340	280	78400	43	420	40	380	144400
14	100	50	50	2500	44	170	40	130	16900
15	930	210	720	518400	45	240	40	200	40000
16	580	40	540	291600	46	110	20	90	8100
17	750	270	480	230400	47	200	370	-170	28900
18	150	30	120	14400	48	490	120	370	136900
19	740	220	520	270400	49	940	510	430	184900
20	130	40	90	8100	50	190	100	90	8100
21	190	30	160	25600	51	340	50	290	84100
22	250	20	230	52900	52	430	160	270	72900
23	880	150	730	532900	53	370	330	40	1600
24	120	20	100	10000	54	230	80	150	22500
25	830	340	490	240100	55	360	180	180	32400
26	220	30	190	36100	56	450	340	110	12100
27	950	350	600	360000	57	360	190	170	28900
28	190	30	160	25600	58	380	120	260	67600
29	420	30	390	152100	59	400	130	270	72900
30	900	690	210	44100	60	100	20	80	6400
					Total	26010	8790	17220	7704200

Each experimental results was the average of five measurements.

c. Plating and Incubation

One ml. of sample was quickly poured into a petri dish, and incubated at  $37^{\circ}\text{C}$  for  $24 \pm 3$  hrs.

### Results and Discussion

The number of colonies of *E. coli*, incubated for  $24 \pm 3$  hrs. on K-medium and Deso-medium respectively, are shown in Table 1, Fig. 1 and Fig. 2. And it was found that the number of colonies on K-medium was more than that on Deso-medium.

Statistical consideration (t-test): The significance of the mean difference was checked by t-test.

Mean differences are

$$\bar{D} = \bar{X}_D = \frac{\sum D}{N} = \frac{17220}{60} = 287.00 \quad (1)$$

and the variance of the differences are obtained by equation

$$S_D^2 = \frac{N \sum D^2 - (\sum D)^2}{N(N-1)} = \frac{60 \times 7704200 - (17220)^2}{(60)(59)} = 46815 \quad (2)$$

the variance of the mean is then

$$S_{\bar{D}}^2 = \frac{S_D^2}{N} = \frac{46815}{60} = 797.00 \quad (3)$$

the standard error of the mean is

$$S_{\bar{D}} = \sqrt{797.00} = 28.23 \quad (4)$$

then

$$t_0 = \frac{\bar{D}}{\sqrt{\frac{N \sum D^2 - (\sum D)^2}{N(N-1)}}} = \frac{287.00}{28.23} = 10.17 \quad (5)$$

From the Table of t, the criterion value of t ( $|t_{0.01}| = 2.617$ ) is less than the calculated t ( $|t_0| = 10.20$ ). Hence, the null hypothesis in this case was rejected at one percent level of significance.

The results above mentioned show that the viable counts of *E. coli* on K-medium are significantly more than those on Deso-medium. This, with facility of its treatment, gives a bright prospect of practical applications to detect *E. coli* indicating the contamination degree of foods.

The author intends to make a comparative study on the development of red colour produced by *Coliforms-colonies* in the case that the same nutrient is added to K-medium as to Deso-medium.

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**References**

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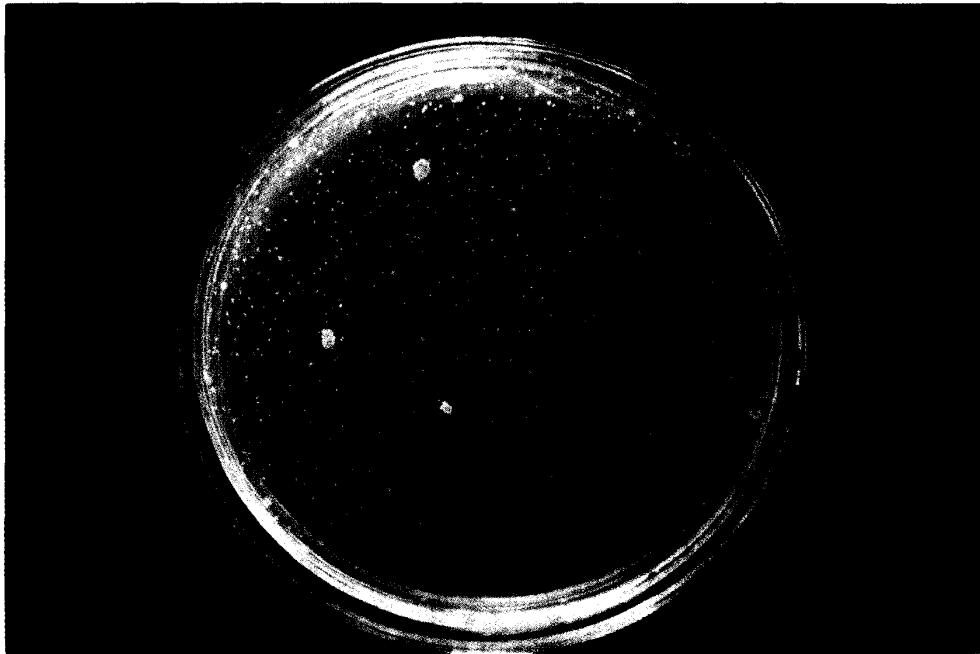


Fig. 1. Growth of *E. coli* on K-medium.



Fig. 2. Growth of *E. coli* on Deso-medium.