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STANDARDIZATION OF BREAD DOUGH RISE CAPACITY USING *KLUYVEROMYCES LACTIS* AND *SACCHAROMYCES CEREVISIAE* YEAST CULTURES

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ABSTRACT

Yeast cultures such as *Kluyveromyces lactis* Ch17 which was isolated from cheese whey was used to prepare bread along with the commercial yeast culture *Saccharomyces cerevisiae* at different proportions (0:100, 100:0, 75:25, 50:50, 25:75) to standardize the Bread Dough Rise Capacity (DRC). The results revearled that the dough rising capacity was maximum in the commercial yeast (control). The combination of cultures of *K. lactis Ch17 and S.cerevesiae* used at equal proportions (50:50) with skim milk powder (3g) and sucrose (edible sugar, 1.5g) improved the DRC than the control sample, the edible sugar when replaced by the lactose at 50 and 100 per cent showed no improvement in the leavening of the bread. The commercial bakers yeast *S.cerevisiae* could successfully be replaced by *K.lactis* Ch17 upto an extent of 50% with better leavening properties in terms of dough volume.

Key words : Baker's yeast, Bread dough, Dough volume, Dough rise capacity (DRC).

The most widely recognized role of yeast is in the preparation of bread and other similar bakery products. Baker's yeast (*Saccharomyces cerevisiae*) is considered to be indispensable tool in the preparation of various bakery foods. Non conventional, a lactose fermenting (Matioli *et al.,* 2001) yeast had been tried alternatively for production of bread to rise the dough capacity. Strains of yeasts such as *Kluyveromyces and Saccharomyces* were used for testing the dough activity prepared with sucrose and lactose (Caballero *et al.,* 1995). The present investigation was carried out to standardize the dough rise of bread by using combination of commercial yeast at different proportions. *Kluyveromyces lactis* (Ch17), isolated from cheese whey was grown on lactose agar slants (pH 6.8) at 25°C for 72 hrs. *Saccharomyces cerevisiae* obtained from Bakery Training uint, UAS, Bangalore and grown on Davi's yeast salt agar slants (pH 6.6) at 25°C for 72 hrs. Slant cultures were subcultured once in a month and stored at refrigeration temperature.

Preparation of normal (control) bread recipe : Basal media containing maida (100gm), sugar (1.5gm), yeast (4.0gm) of *K.lactis* Ch17 and *S.cerevisiae* at 0:100, 100:0, 75:25, 50:50, 25:75, and water (60ml) were added and made into complete dough in a mixing bowl. This dough was transferred to the measuring jar and the initial level was noted down after levelling the surface lightly. This was kept covered at 27 to 30°C for 1 hr and the raised dough level was noted.

Preparation of milk bread recipe or modified bread : Basal media containing, maida (100gm), sugar (1.5gm), yeast (4.0gm), skim milk (3 gm) and water (60ml) were added and made into complete dough in a mixing bowl. This dough was transferred to the measuring jar and the initial level was noted down after levelling the surface lightly. This was kept covered in dark at 27°C to 30°C for 1 hr and the raised dough level was noted. The DRC computed as :

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Table 1. DRC of different samples when the mixed yeast cultures at different combinations were used in ordinary bread recipe.

Dough Volume Initial Vol (in cms)	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
(V1)	2.8	2.8	2.8	2.8	2.8
Final vol (in cms) V2	10.1	5.9	8.5	8.8	8.9
Dough rise (V2–V1) (in cms)	7.3	3.1	5.7	6	7.1
DRC = $\frac{V2–V1 \times 100}{V1}$	260.714*	110.714*	203.571*	214.285*	253.571*

C = Dough Rish Capacity Note :- Minimum DRC should be 80% of the initial volume i.e., 5.04 cms.
** All figures are average of 3 values which are significant at ($P < 0.05$)

	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
S.cerevisiae	100	0	25	50	75
K.lactis Ch17	0	100	75	50	25

$$DRC = \frac{\text{Final level} - \text{Initial level}}{\text{Initial level}} \times 100$$

Note = a maximum rise should be 80% of the initial volume.

Sample 2 containing only *K.lactis* Ch17 (Vilas Sameneni, 1999) failed to show minimum dough rise of 5.04 cms while DRC of sample 5 resembled to that of control bread containing only *S.creevisiae* (sample 1) with DRC of 7.1 followed by sample 4 and sample 3 which contain equal of *S.cerevisiae* and 75:25 of *K.lactis* Ch17 and *S.cerevisiae* (Table 1). Shilpa and Gandhi (1993) studied the leavening properties of lactose fermenting yeast and commercial yeast, lactose fermenting yeast and baker's yeast leavening properties were comparable yeast, lactose fermenting yeast and baker's yeast leavening properties were comparable but maximum was in baker's yeast. In case of milk bread dough the DRC of the samples with only *S.cerevisiae* and *K.lactis* Ch17 at (50:50), *K.lactis* Ch17 and *S.cerevisiae* at (25:75) almost same, sample with *S.cerevisiae* and *K.lactis* Ch17 at 50:50 showed may negligible increase in DRC (Table 2). The results indicated the *K.lactis* Ch17 present in the sample 2 showed better fermentative ability in the milk bread recipe in which lactose was present in the skim milk powder, SMP addition to the bread improves nutritional quality also. The milk bread recipe was slightly modified by adding edible sugar at 1.5g and when this edible sugar was replaced by lactose at

Table 2. Dough rise capacities of different samples when the mixed yeast cultures at different combinations were used in milk bread recipe.

Dough Volume Initial Vol (in cms)	Sample 1	Sample 2	Sample 3
(V1)	3	3	3
Final vol (in cms) V2	9.6	9.8	9.7
Dough rise (V2–V1) (in cms)	6.6	6.8	6.7
DRC = $\frac{V2–V1 \times 100}{V1}$	220.00*	222.66**	223.33**

** All figures are average of 3 values which are significant at ($P < 0.05$)

	Sample 1	Sample 2	Sample 3
S.cerevisiae	100	50	75
K.lactis Ch17	0	50	25

50% and 100% and fermented using 100% *S.cerevisiae,* 50:50 of *S.cerevisiae* and *K.lactis* Ch17 as this combination showed better DRC compared to control. DRC test was conducted with milk bread recipe by mixing maida, yeast, skim milk powder, edible sugar, lactose and water into complete dough and allowing the dough to stand at 27 to 30°C for 1 hr. Sample 2 showed the best dough volume rise of 6.8 cms followed by sample 3 which showed a dough volume rise of 6.7 cms. Sample 1 showed a dough volume rise of 6.6 cms and sample 4 showed 5.0 cms. Sample 4 failed to show the minimum dough volume rise of 5.04 cms as given in Table 3. The

Table 3. Dough Rise Capacity when the mixed yeast cultures at different combinations with different percentage of sugars were used in milk bread recipe.

Dough Volume Initial Vol (in cms)	Sample 1	Sample 2	Sample 3	Sample 4
(V1)	3	3	3	3
Final V2 (in cms)	9.6	9.8	9.7	8
Dough rise (V2–V1) (in cms)	6.6	6.8	6.7	5
$DRC = \frac{V2–V1 \times 100}{V1}$	220.00*	226.66**	223.33**	166.66**

** All figures are average of 3 values which are significant at ($P < 0.05$)

	Sample 1	Sample 2	Sample 3	Sample 4
S.cerevisiae	100	50	50	50
K.lactis Ch17	0	50	50	50
Edible sugar	1.5g (100%)	1.5g (100%)	0	0
Lactose	0	0	0.75g (50%)	1.5g (100%)

results indicated that the addition of free lactose to the recipe did not show any improvement in the fermentative activity of the *K.lactis Ch17*.

CONCLUSION

From the investigations, it could be inferred that during the preparation of milk bread, *K.lactis* Ch17 (a lactose fermentin yeast from whey source) exhibited better property of DRC with improved nutritional content of control, when used in equal proportions with the commercial baker's yeast (*S.cerevisiae*). Hence, this commercially available baker's yeast could successfully be replaced by *K.lactis* Ch17 up to an extent of 50% with better leavening properties in terms of dough volume.

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