SENSORY PANEL TESTING OF THE CHEESE RIPENED WITH *ASPERGILLUS ORYZAE-CHOSEN B**

By

Fumisaburo TOKITA and Takeo NAKANISHI

Department of Animal Husbandry, Faculty of Agriculture, Tohoku University, Sendai, Japan

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Introduction

Oryzae cheese, which was so named after *Aspergillus oryzae-chosen* B (1) used to ripen the cheese, is similar to Blue cheese in its ripe index, distribution of nitrogenous compounds and contents of carbonyl compounds (2, 5, 6, 10) at the same ripening condition. The cheese, however, is similar to Camembert cheese in the character of the electrophoretic patterns on water-insoluble protein extracted from it (5, 6). It will be seen from these results that there are characteristic cheese taste and odour in the Oryzae cheese which are different from the well known cheeses.

The purpose of the present investigation is to describe the taste on the flavour of the Oryzae cheese by the sensory panel testing, and to show the indication for further improvement of its manufacturing.

Experimental Procedure

Cheese samples

The cheese samples were made from Dutch type cheese to which two kinds of mould powders were added one percent at hooping (2, 5). As the mould powders, the extracellular enzyme and the washed cell powder were prepared with *Asp. oryzae-chosen* B by the methods given in the authors' previous (2, 3, 4). Three kinds of cheese samples were used in this testing as the samples; the first one of them is the control Dutch type cheese (D-cheese), the second one is the cheese (E-cheese) added with the extracellular enzyme powder and the third one is the cheese (W-cheese) added with the washed cell powder. These cheeses were ripened under the same condition of about 10°C in the relative humidity of 85 to 95 per cent for four months.

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Sensory panel testing (7, 8, 9)

Taste, smell and odour are important questions continually challenging food manufactures, researchers and technologists when they seek dependable appraisals of their products. In this testing, judgments by our sense and statistical analysis, namely the comparatively latest sensory panel testing techniques were employed to analyze the taste and odour of cheese making on trial.

Location ..... If possible, all the taste or odour work should be done in a special room. In this testing, the laboratory was used as the location of semi-partitioned check systems. In this case, it is important to notice complete ventilation of the room and no agreement of each panel members (11).

Panel member size ..... For routine investigation and difference testing, a panel of 10 to 30 persons will suffice (12), and 10 judges were employed in this testing.

Type of the testing ..... In general, a food sensory problem will seek answers to one or more of the three questions. In these questions, two questions, 1) is there a difference between the samples? 2) which is prefered by the panel members in this testing if there is difference?

The three kinds of the cheese samples were desired to compare the two of them for the same quality judgement. The members must be assigned a relative numerical score by their judge. The method will be named "Numerical Scoring of Paired Stimuli" (13). For the scoring, the system of apportioning 10 points to the two samples were employed to describe in termes indicating degree of excellence. For example, the case of a sample is apportioned 7 points, the other one of the pair is apportioned 3 points.

Analyzing results ..... The quality judgement tests hinge on laws of chance and probabilty; it is necessary to have some understanding of the statistical methods. The statistical methods may be used as a guide in determining the significance to the results obtained with sensory panels (13).

For Numerical scoring tests, the following formulas were used in determining the signeficance of differences of the average scores samples tested. Here, the finding of the differences (d) among the scores given for the two samples by the 10 testers,

$$d = X_1 - X_2$$

then determining the standard deviation of the differences (σd) between scores,

$$\sigma d = \sqrt{\frac{\sum d^2}{N} - \bar{d}^2} \quad \text{or} \quad \sqrt{\frac{\sum d^2}{N-1} - \frac{(\sum d)^2}{N(N-1)}}$$

$\sum$ = summation, N = number of judges

$\bar{d} = \bar{X}_1 - \bar{X}_2$ = average difference, $\bar{X} = \sum X/N$ = average,

and determinig the standard error of the difference ($\sigma_{(\bar{X}_1 - \bar{X}_2)}$) among means,

using the standard deviation of paired differences,

$$\sigma(\bar{X}_1-\bar{X}_1) = \sqrt{\frac{\sigma^2 d}{N}}$$

to determine the significance, calculate the critical ratio.

$$(\text{C. R.}) = \frac{d}{\sqrt{\frac{\sigma^2 d}{N}}}$$

This values for level of significance were interpreted at the 5 per cent level of probabilty by using the Student's "t" table because the degree of freedom was less than 30.

Results and Discussion

Discriminating ability of the panel used.

Discriminatory power of the panel is probably more important for the sensory panel testing. In this testing paired alike cheeses arranged at random in the various cheese samples were presented simultaneously and the judges determined if they are the same or different. The scores and results obtained are shown in Table 1. From the results, the C. R. values were smaller than 2.26 which is a C. R. value at 5 per cent level of probability in 9 degrees of freedom, namely the paired alike cheeses were judged to have no significant difference by the Paired Stimuli of the panel. These results support the view that the panel serves the discriminating ability to judging cheese flavour by their sense.

Table 1. The numerical scores and their results of paired alike cheese by sensory testing of the panel.

Panel	Cheese		Difference		Cheese		Difference		Cheese		Difference	
	A	A	d	d^2	B	B	d	d^2	C	C	d	d^2
1	5	5	0	0	5	5	0	0	5	5	0	0
2	5	5	0	0	5	5	0	0	4	6	−2	4
3	4	6	−2	4	4	6	−2	4	5	5	0	0
4	5	5	0	0	6	4	+2	4	5	5	0	0
5	6	4	+2	4	6	4	+2	4	6	4	+2	4
6	5	5	0	0	5	5	0	0	5	5	0	0
7	5	5	0	0	5	5	0	0	5	5	0	0
8	6	4	+2	4	4	6	−2	4	6	4	+2	4
9	6	4	+2	4	6	4	+2	4	4	6	−2	4
10	4	6	−2	4	5	5	0	0	5	5	0	0
Σ	51	49	+2	20	51	49	+2	20	50	50	0	16
	$\sigma d = \sqrt{2.177}$				$\sqrt{2.177}$				$\sqrt{1.777}$			
	C.R. = 0.4286				0.4286				0			

Futhermore, it is apparently found from the many tests that cheese flavour is compartively peculiar and not so difficult to judge whether they are the same or different.

The taste of the Oryzae cheese.

The scores and results of the taste on the cheese samples are shown in Table 2. The Table shows clearly that the C.R. valus in the scores between the D- and E-cheese, W- and E-cheese and D- and W-cheese were 0.3186, 2.7028 and 13.8991 respectively, and significant differences were found between D- and W-cheese and E- anb M-cheese. This apparently indicated that W-cheese was different remarkably from the other cheese samples, and is interpreted to correspond more with taste. From the results it will be seen that the cheese is changed for good taste corresponding with our taste by adding the washed cell powder of Asp. oryzae-chosen B to it and ripening under the normal condition. The cheese, however, is not so changed for good taste by adding the extracellular enzyme powder to it.

Table 2. The numerical scores and their results in taste of the Oryzae cheese by the sensory panel testing.

Panel	Cheese		Difference		Cheese		Difference		Cheese		Difference	
	D-	E-	d	d^2	W-	E-	d	d^2	D-	W-	d	d^2
1	4	6	−2	4	6	4	+2	4	3	7	+4	16
2	5	5	0	0	6	4	+2	4	4	6	+2	4
3	5	5	0	0	6	4	+2	4	4	6	+2	4
4	4	6	−2	4	6	4	+2	4	3	7	+4	16
5	6	4	+2	4	3	7	−4	16	2	8	+6	36
6	6	4	+2	4	7	3	+4	16	3	7	+4	16
7	5	5	0	0	7	3	+4	16	3	7	+4	16
8	7	3	+4	16	8	2	+6	36	3	7	+4	16
9	5	5	0	0	6	4	+2	4	3	7	+4	16
10	4	6	−2	4	6	4	+2	4	4	6	+2	4
Σ	51	49	2	36	61	39	22	108	32	68	36	128
	$\sigma d = \sqrt{3.952}$				$\sqrt{6.623}$				$\sqrt{0.067}$			
	C.R. = 0.3186				2.7028				13.8991			

The odour of the Oryzae cheese.

The scores and results of the odour on the same cheese samples are shown in Table 3. From the data it is apparently indicated that the W-cheese was changed for good odour by adding the washed cell powder to it such as in the case of the results of taste. The E-cheese, however, is not so changed for good.

Table 3. The numerical scores and their results in odour of the Oryzae cheese by the sensory panel testing.

Panel	Cheese		Difference		Cheese		Difference		Cheese		Difference	
	D-	E-	d	d^2	W-	E-	d	d^2	D-	W-	d	d^2
1	4	6	+2	4	6	4	+2	4	4	6	+2	4
2	5	5	0	0	6	4	+2	4	4	6	+2	4
3	5	5	0	0	6	4	+2	4	4	6	+2	4
4	4	6	+2	4	5	5	0	0	3	7	+4	16
5	5	5	0	0	4	6	−2	4	3	7	+4	16
6	6	4	−2	4	6	4	+2	4	3	7	+4	16
7	5	5	0	0	7	3	+4	16	4	6	+2	4
8	6	4	−2	4	7	3	+4	16	4	6	+2	4
9	5	5	0	0	6	4	+2	4	3	7	+4	16
10	4	6	+2	4	6	4	+2	4	4	6	+2	4
Σ	49	51	2	20	59	41	18	60	36	64	28	88
	$\sigma d = \sqrt{2.177}$				$\sqrt{3.366}$				$\sqrt{1.066}$			
	C.R. = 0.4282				3.1023				8.5758			

Summary

It is the object of this paper to describe the taste and odour of the Oryzae cheese by the sensory panel testing. The cheese samples were made from Dutch type cheese to which the extracellular enzyme and the washed cell powder prepared from *Asp. oryzae-chosen* B were added at the hooping, and the cheeses were ripened under the normal condition. For the sensory panel testing, Numerical Scoring of Paired Stimuli by 10 persons panel was employed in this testing. From the results it is clearly summarized as follows.

The cheese is apparently changed for good flavour corresponding with our taste by adding the washed cell powder to it. The cheese, however, is not changed so apparently for good flavour by adding the extracellular enzyme powder to it.

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