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## The Type of Fish and Storage Time to The Characteristics of *Pedetan* in Jembrana Bali

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### Abstract

*This study aims to determine the study of fish type and storage time to the characteristics of 'pedetan' fish in Jembrana-Bali. This research was conducted in March-May 2015 at Agricultural Processing Laboratory of Agricultural Faculty of Warmadewa University and TVB (Total Volatile Base) analysis was conducted at Fishery product and Quality Control Laboratory of Bali Province. The design used was Factorial Randomized Block Design (RAK) pattern consisting of two treatments and three replications. The first treatment is fish, the type of *Sardinella sirm* and *Sardinella bleeker*. The second treatment is the storage time which is consisting of 7 levels ie storage time 0 week, 2 weeks, 4 weeks, 6 weeks, 8 weeks, 10 weeks, and 12 weeks. Observations are made objectively and subjectively. Objective observations include water content, acidity (pH), weight change, and TVB. Subjective observations include appearance, odor, taste, texture, and fungus using assessment method in accordance with the Indonesian standard of quality (SNI 2721.1: 2009). From the objective observation result, water content ranged from 8.13 to 17.07%, pH 6.18-6.55, weight loss 0 - 1.44%, and TVB 34.22 - 53.62 mg-N / 100gram, and subjective observations obtained with specification values ranging from 7.13 to 8.27, odor 7.15 - 8.31, flavors 7.07 - 7.71, texture 7.22 - 7.91, mushrooms (no mushrooms). All analysis parameters above meet the Indonesian standard of quality (SNI 2721.1: 2009). From the results of the study, it was found that *Sardinella sirm* and *Sardinella bleeker* with a duration of 12 weeks can maintain the characteristics of pedetan on storage.*

*Keywords: Pedetan, Sardinella sirm, Sardinella bleeker*

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### 1. Introduction

Gray fish (*Sardinella sirm*) and Sardine fish (*Sardinella bleeker*) are found on the coast of Jembrana waters. The *Sardinella sirm* is the type of fish that has the highest production compared with other fish species that reach 52% of all catches. The *Sardinella bleeker* during the east season, the catch of fishermen is abundant and there is overproduction but do not get proper handling so that it suffered damage and decay [1].

*Pedetan* is a processed traditional Balinese fish. People on the coast of Jembrana are processing *S. sirm* and *S. bleeker* to *pedetan* to extend the shelf life. Fish are cleaned in strips (drawn in the entrails and fish heads) seasoned and dried [2],[3]. The packaging process undertaken by the Melaya community of Jembrana District still uses simple tools, such as *beseq*, *nyiru*, *para-para*, so that the shelf life of *pedetan* is relatively short ( $\pm$  4 - 8 weeks) [4]. The packing of *pedetan* with vacuum plastic packaging, polypropylene plastic and mica plastic can extend the life of shelf, *pedetan* for the sixth month with subjective and subjective assessment results still meet the requirements of SNI 2721 1: 2009 [5],[6].

To maintain product quality during large amounts of storage and long periods of time, it is neces-

sary to use appropriate packaging materials in order to maintain product quality. In this study we studied fish species and storage time to the characteristics of *S. sirm* and *S. bleeker* packed with mica plastic on storage.

## 2. Material and Methods

The research was conducted at Agricultural Analysis Laboratory, Faculty of Agriculture, University of Warmadewa. Analyze the chemical properties of *S. sirm* and *S. bleeker* trays were conducted at the Agricultural Analysis Laboratory, Warmadewa University, while for Total Volatile Base (TVB) analysis was performed at the Laboratory of Quality Control and Quality of Fishery Products of Bali Province. The timing of this research is conducted from March 2015 to May 2015.

The research material used *pedetan* is *S. sirm* and *S. bleeker* obtained from processing *pedetan* at Melaya Village, Melaya District Jembrana District. The materials used for chemical analysis are Aquades, 100 ml NaOH, Perchloric acid 6%, 20% NaOH solution, Solution, H<sub>3</sub>BO<sub>3</sub> 3%, HCl O, O<sub>2</sub> N solution. The research equipment used for the packaging of *S. sirm* and *S. bleeker* is mica plastics, scissors, stickers, cardboard, pens, paper, trays, clamps, weighers or Pocket scale, blenders, porcelain cup, weigh plastic, oven, pH meter, glass beaker, burette, glass mouthpiece, Erlenmeyer, cup glass, coarse filter paper, vacuum flask, steam distillation set, analytical scales with precision 0.0001 gram, and instrument for organoleptic test.

The experimental design used in this study was the Randomized Block Design of the factorial pattern with two treatment factors including the first factor of fish, using two types of fish, namely *S. sirm* and *S. bleeker*. The second factor is long storage with 7 levels ie storage length 0 weeks, 2 weeks, 4 weeks, 6 weeks, 8 weeks, 10 weeks, 12 weeks.

Observation of water content was done by heating method [7], the degree of acidity or pH of *pedetan* was measured using pH meter [8]. The observation of heavy shrinkage during storage was done by weighing the weight of *S. sirm* and *S. bleeker* before and after storage [9]. The TVB (Total Volatile Base) observation based on SNI 2354.8: 2009 [10], and Subjective Observation Organoleptic testing was performed by hedonic test (SNI 2354.8.2.2009) [10].

## 3. Results and Discussion

### 3.1 Water content

The average value on the table 1 of water content of fish treatment, ash water content of different *S. sirm* is not real with water content of the *S. bleeker*. The highest water content was found in *S. bleeker* species which was 12.81% and the lowest in *S. sirm* species was 12.80%. While the storage treatment time is very different from the average value of water content, which ranges from 8.13 - 17.07 %. The highest moisture content of the *S. sirm* and *S. bleeker* obtained from the 2 weeks old storage treatment, that is 17.07 %, the high moisture content caused by the moisture of the storage room is higher than the product so that the product will absorb water causing the water content becomes high [11]. As for the average value of the lowest moisture content obtained from the storage period of 10 weeks that is equal to 8.13%, lower water content caused by the type of fish used is the ash and *S. bleeker* are processed with the provision of salt, vinegar and spices that can reduce levels the water becomes lower [5] compared with dried salted fish of 40% and dried anchovies 38.7% [12].

Based on SNI 2721.1: 2009, the water content of dried salted fish is about 40%, meaning that the water content of the *S. sirm* and *S. bleeker* for 0-12 weeks meet the specified standard.

Table 1  
The Effect of Treatment on The Water Content

The Fish	Storage Duration (weeks)							Average
	0	2	4	6	8	10	12	
<i>S. sirm</i>	15.33	18.25	11.81	12.25	11.75	7.99	12.21	12.80a
<i>S. bleeker</i>	15.86	15.90	12.47	13.00	12.03	8.26	12.15	12.81a
Average	15.60c	17.07d	12.24b	12.36b	11.89b	8.13a	12.18b	

Note: The same letter on the back of the average value on the same row or column shows an unreal difference ( $P > 0.05$ ).

### 3.2 Degree of Acidity (pH)

The average value on the table 2 of pH of fish treatment, *S. sirm* and *S. bleeker* ranged between 6.31 - 6.35, statistically show different results are not real. The highest average pH value was obtained on the *S. bleeker* type of fish that is 6.35 and the lowest average pH value was found in the *S. sirm* species is 6.31. In the old storage treatment, the average value of pH of *S. sirm* and *S. bleeker* is significantly different from 6.18 - 6.55. The lowest average value was obtained in the 0 week storage treatment that was 6.18, but it was not significantly different with the storage time of 2, 4, and 6 weeks while the highest was obtained in the 12 weeks old storage treatment which was 6.55. The increase of pH in fish is caused by the process of decomposition in which amino acid protein content is converted into alkaline ammonia compounds [13].

Table 2  
The Effect of Treatment on The Level Acidity (pH)

The Fish	Storage Duration (weeks)							average
	0	2	4	6	8	10	12	
<i>S. sirm</i>	6.17	6.13	6.33	6.23	6.37	6.50	6.47	6.31a
<i>S. bleeker</i>	6.20	6.30	6.20	6.20	6.57	6.37	6.63	6.35a
Average	6.18a	6.22a	6.27a	6.22a	6.47b	6.43b	6.55b	

Note: The same letter on the back of the average value on the same row or column shows an unreal difference ( $P > 0.05$ ).

### 3.3 Weight Loss

The treatment on the table 3 of fish ranged from 0.61 to 0.74%, where the weight loss of different *S. sirm* is not evident with heavy shrinkage of *S. bleeker*. The highest weight shrinkage value was obtained from *S. bleeker* species that was 0.74% and the lowest was from *S. sirm* that was 0.61%. In the long treatment of storage, the weight shrinkage average value ranges from 0 - 1.44%. The highest mean shrinkage value was obtained at 12 weeks storage time of 1.44% and the lowest was obtained at the storage time of 0 weeks (control). The occurrence of increased weight changes in *S. sirm* and *S. bleeker* on storage may be caused by moisture absorption from storage environments supported by relatively high daily moisture data [9]. The permeability of polypropylene and polyethylene plastic packaging materials at room temperature storage further accelerates the absorption of water vapor [14]. In this study, the humidity of the storage room ranged between 60-86%. The increase of heavy shrinkage on storage of *S. bleeker* that is stored for 3-12 weeks is caused by the absorption of steam that continues to increase with the length of storage so that the weight loss is greater [15].

Table 3  
The Effect of Treatment on The Weight Loss

The Fish	Storage Duration (weeks)							average
	0	2	4	6	8	10	12	
<i>S. sirm</i>	0	0.17	0.58	0.64	0.70	0.96	1.21	0.61a
<i>S. bleeker</i>	0	0.21	0.43	0.63	1.04	1.22	1.66	0.74a
Average	0	0.19a	0.51b	0.64b	0.87c	1.09d	1.44e	

Note : The same letter on the back of the average value on the same row or column shows an unreal difference (P> 0.05).

### 3.4 Total Volatile Base (TVB)

The average value on Table of fish treatment ranged from 41.42 - 50.49 mg-N / 100gram which statistically showed no significant difference (P> 0.05) to the average TVB value of *S. sirm* and *S. bleeker*. The highest average value obtained from *S. bleeker* species is 50.49 mg-N / 100 gram and the lowest is obtained from *S. sirm* species that is 41.42mg-N / 100gram. In the long storage treatment, the average TVB values ranged from 34.32 - 41.42 mg-N / 100gram, with the highest value obtained at 6 weeks storage time of 53.62 mg-N / 100 gram and the lowest obtained at 12 weeks storage time of 34.32 mg-N / 100 gram. The high value of TVB on *S. sirm* and *S. bleeker* is suspected because fish protein has been degraded by microorganism and because of enzyme activity. The content of TVB in this study still meets the quality requirements of TVB content for salted fish and salted fish. The maximum TVB content in salted fish and salted fish should not be more than 100 mg-N% of fish meat [16].

Table 4  
The Effect of Treatment on The TVB

The Fish	Storage Duration (weeks)							average
	0	2	4	6	8	10	12	
<i>S. sirm</i>	39.23	47.81	43.40	36.68	48.31	45.57	28.93	41.42a
<i>S. bleeker</i>	49.35	53.03	60.77	70.56	28.69	51.33	39.70	50.49a
Average	44.29ab	50.42ab	52.08ab	53.62ab	38.50ab	48.45ab	34.32a	

Note: The same letter on the back of the average value on the same row or column shows an unreal difference (P> 0.05).

### 3.5 Subjective Analysis

#### The appearance

The values on the Table 5 given by panelists ranged from 7.13 to 8.27 (whole, less clean, slightly dull, to whole, tidy, and luminous by type) where the highest panelist appearance value against *S. sirm* and *S. bleeker* was obtained on the type of fish with the duration of 10 weeks storage is 8.27 (with the specification between intact, clean, less tidy, shiny by type until intact, neat and luminous by type), while the lowest obtained in type fish treatment with 4 weeks long storage treatment that is 7.13 (with specification between whole, less clean, slightly dull to whole, less tidy, shiny by type). Based on SNI 2721.1: 2009, the value of the appearance on the organoleptic test still meets the requirements of SNI 2721 1: 2009 at least 7 [6].

#### The Smell

The values on the Table 5 given by panelists ranged from 7.13 to 8.31 (with a nearly neutral speci-

fication, slightly additional odor, to fragrant, specific types, without additional odors) with the average value of panelist judgments on the stinking smell of the *S. sirm* and *S. bleeker* was obtained on the treatment of *S. sirm* species with 8 weeks old storage treatment ie 8.31 (with the specification between less fragrant, no additional odor until fragrant, specific type without additional odor), while the lowest obtained in *S. bleeker* type treatment with 6 weeks storage treatment that is 7.15 (with almost neutral specifications, a bit of extra odor until fragrant, specific types without additional odors). The odor specification value in the organoleptic test still meets the requirements of SNI 2721 1: 2009 at least 7 [6].

Table 5  
The Effect of Treatment on The Sensory

The Treatment	The appearance	The Smell	The Flavors	The Texture	Fungi
<i>S. sirm</i> 0	8.18b	7.89ab	7.71c	7.91c	9.00a
<i>S. sirm</i> 2	7.78ab	8.09abc	7.40abc	7.51ab	9.00a
<i>S. sirm</i> 4	7.55ab	8.02abc	7.62bc	7.35a	9.00a
<i>S. sirm</i> 6	8.07ab	7.76a	7.07a	7.53abc	9.00a
<i>S. sirm</i> 8	7.33a	8.31c	7.27ab	7.80bc	9.00a
<i>S. sirm</i> 10	7.82ab	7.98abc	7.27ab	7.33abc	9.00a
<i>S. sirm</i> 12	7.82ab	8.15bc	7.27ab	7.42ab	9.00a
<i>S. bleeker</i> 0	8.22bc	7.51ab	7.33a	7.78a	9.00a
<i>S. bleeker</i> 2	7.51abc	7.49ab	7.38a	7.71a	9.00a
<i>S. bleeker</i> 4	7.13a	7.16a	7.27a	7.58a	9.00a
<i>S. bleeker</i> 6	7.35a	7.15ab	7.40a	7.49a	9.00a
<i>S. bleeker</i> 8	7.84abc	8.09b	7.09a	7.82a	9.00a
<i>S. bleeker</i> 10	8.27c	8.04b	7.16a	7.22a	9.00a
<i>S. bleeker</i> 12	7.49ab	8.11b	7.18a	7.60a	9.00a

Note: The same letter on the back of the average value on the same row or column shows an unreal difference ( $P > 0.05$ ).

### The Flavors

The average value on the Table 5 of flavored specs given by panelists ranges from 7.01 - 7.71 (with specific specifications of type, slightly additional flavor, to type specific taste, no additional flavor) with the highest average value obtained by value at treatment type of *S. sirm* with weekly storage treatment of 0 weeks is 7.71 (with specification between tasty specific type, slightly additional flavor to very tasty specific type, without additional flavor) and the lowest obtained in the treatment of *S. sirm* with 6 weeks old storage treatment of 7.07 (with specification less tasty, a little extra flavor until somewhat tasty specific type, little extra flavor). Based on SNI 2721.1: 2009, the average value of specification of *S. sirm* and *S. bleeker* products still meets the SNI 2721.1: 2009 standard which is at least 7 [6].

### The Texture

The average values on the Table 5 given by the panelists for texture specifications ranging from 7.22 - 7.91 (with specifications too hard not brittle to solid, compact, flexible, dry enough). The highest average value was obtained in the treatment of *S. sirm* with a 0 week long storage treatment of 7.91 (with the specification between too hard, not brittle to solid, compact, flexible, less dry) and the lowest obtained in the treatment of *S. bleeker* species with long treatment of storage 10 weeks is 7.22 (with the specification between too hard, not brittle to solid, compact, flexible, less dry). The muscle and fish cells will contract due to water discharge from fish after dehydration process osmosis [17].

The discharge of water due to the salt is osmotic causes the texture of the fish becomes hard and not rubbery anymore. Specification value of salted fish texture based on SNI 2721.1: 2009 is at least 7 [6]. Thus the specification value of the *S. sirm* and *S. bleeker* up to 12 weeks meet the standard of salted fish.

### **The Fungi**

The average value of fish treatment, storage duration, or interaction of both treatments showed significant effect ( $P > 0.05$ ) on the value of *S. sirm* and *S. bleeker*. The average value of fungi on the organoleptic test is 9.00 and meets the requirements of SNI 2721 1: 2009 is at least 7 [7], where storage for 12 weeks with plastic packaging no fungal growth.

### **4. Conclusion**

The subjective and objective observations, 12 weeks' storage can retain the characteristics of *S. sirm* and *S. bleeker* on storage. The objective analysis on ash product of *S. sirm* and *S. bleeker* packed with mica plastic, with treatment time 0 - 12 weeks obtained water content ranged from 8.13 to 17.07%, pH ranged from 6.18 to 6.55, weight change ranged from 0.15- 1.66%, and TVB ranged from 28.69 - 70.56 mg-N / 100gram. Meanwhile, the subjectively covering the appearance, smell, taste, texture, and fungi on ash product of *S. sirm* and *S. bleeker* packed with mica plastic with 0 weeks storage time - 12 weeks meet the standard of SNI 2721 1: 2009.

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