

A STUDY ON THE AVERAGE YIELD OF DIFFERENT SPECIES OF PRAWNS USED FOR FREEZING AND CANNING

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The paper deals with the average yield of four species of prawns viz. *Metapenaeus dobsoni*, *Metapenaeus affinis*, *Parapenaeopsis stylifera* and *Penaeus indicus* on conversion to peeled and deveined (PD), cooked and peeled (CP) and head less shell on (HL) forms in the different months of a year and the likely variations observed in the average yield.

INTRODUCTION

The prawn catch for the last few years has shown an increasing trend. The percentage of prawn catch to the total marine landings ranges from 10 to 16% during this period. Side by side, the export of processed prawn products has also shown an increasing trend. Out of the prawn products exported from India frozen prawns comprises a major share both in terms of quantity and value. Important species of prawn used for freezing are *Metapenaeus dobsoni* (poovalan), *Metapenaeus affinis* (kazhandan), *Parapenaeopsis stylifera* (karikadi) *Penaeus indicus* (sea naran) and *Penaeus monodon* (kara chemmeen). Although these species were used for processing for the last so many years, no reliable estimate regarding the average yield of the said species has been worked out so far. Though some figures

were published by Indian Institute of Foreign Trade (1970) they were not complete by themselves as they failed to reveal the fluctuations in the average yield of these species over the different months of the year. Reliable estimates leading to conversion factors are required both by the fishery technologists and the prawn processing industry. The fishery technologists require such an estimate to verify the validity of the estimated landings of prawns with those exported. The industry requires such estimates for planning and production. This study was undertaken with a view to working out the conversion factors of the important species of prawns used for processing so as to meet the needs of the technologists and the industrialists engaged in this field.

MATERIALS AND METHODS

Data on the total quantity of whole

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prawns of different species handled daily by the factories and the quantity of PD, HL, and CP produced after conversion were collected by visiting the processing factories and peeling centres attached to the processing factories regularly. These data were collected for a period of one year (1973) excluding the monsoon months June, July, August and September for the five important species of prawns. Generally, small size prawns were converted to PD form for freezing and canning and bigger size were converted to HL form. In rare cases, the shell damaged and broken pieces also were converted to PD form.

The data collected were compiled and the percentage yield on conversion to HL, PD and CP of the different species in the days of production in different months were worked out. Also, from the percentage yield worked out for the days, the average for the months as a whole was calculated and the standard deviation (SD) and the 95% confidence interval (CI) for the population mean were calculated. Analysis of variance technique was used for testing the significance of variation of the average percentage yield in the different months. For framing the ANOVA table, the per-

centages were converted to degrees using the angular transformation. By this transformation the variance was expected to be stabilised.

RESULTS AND DISCUSSION

Table I (a), (b), (c) and (d) give the mean, standard deviation and the 95% confidence interval for the population mean of the 4 species *M. dobsoni*, *M. affinis*, *P. stylifera* and *P. indicus* respectively on conversion from whole to PD and HL as the case may be for the different months under study. From Table I (a), it could be seen that the lowest average yield of *M. dobsoni* on conversion from whole to PD was 41.46% in March and highest yield of 44.33% in May. Standard deviation was found to be the lowest in October and the highest in March and April. The spread of the confidence interval for average yield was found to be short in October. Also, *M. dobsoni* when converted to peeled form with tail on has shown a 3% increase in yield compared to peeled and deveined type.

For *M. affinis* (Table 1-b), the maximum average yield of 49.52% on conversion

TABLE I (a)
Mean S D and 95% confidence interval
M. dobsoni (poovalan) whole to PD.

Month	No. of days observed	Mean yield %	S D	95% C I
January	19	42.28	1.85	41.25 - 42.75
February	18	43.72	1.93	42.66 - 44.68
March	16	41.46	2.23	40.27 - 42.65
April	20	41.75	2.22	40.71 - 42.79
May	15	44.43	2.03	43.21 - 45.45
October	14	42.00	1.30	41.25 - 42.75
November	17	42.38	1.50	41.61 - 43.15
December	17	43.65	1.73	42.75 - 44.53

TABLE I (b)
M. affinis (kazhandan) whole to PD.

Month	No. of days observed	Mean yield %	S D	95% C I
January	23	4.689	2.27	45.91 - 47.87
February	18	46.58	2.23	45.47 - 47.69
March	21	45.76	1.49	45.08 - 46.44
April	25	47.78	3.05	46.52 - 49.04
May	17	49.52	2.11	48.44 - 50.60
October	14	48.39	2.03	47.22 - 49.56
November	23	46.60	1.78	45.83 - 47.37
December	17	45.97	2.10	44.89 - 47.05

TABLE I (c)
P. stylifera (karikadi) whole to PD

Months	No. of observations	Mean yield %	S D	95 % C I
January	19	37.13	1.97	36.18 - 38.08
February	15	36.37	0.71	35.98 - 36.76
March	15	33.57	1.97	22.48 - 34.65
April	23	35.46	1.43	34.84 - 36.08
May	11	35.82	1.71	34.67 - 36.97
October	13	33.64	1.67	32.64 - 34.65
November	20	35.42	1.52	34.71 - 36.13
December	16	36.12	2.31	34.99 - 37.45

TABLE I (d)
P. indicus (naran) whole to HL

Month	No. of observations	Mean yield %	S D	95 % C I
January	13	64.83	4.95	61.84 - 67.42
February	16	65.91	2.17	64.75 - 67.07
March	19	64.85	1.79	63.99 - 65.71
April	18	66.13	1.19	65.54 - 66.72
May	7	66.00	3.21	63.03 - 68.97
November	12	67.13	1.71	66.04 - 68.22
December	17	67.06	1.42	66.33 - 67.69

ANOVA of monthly yield

TABLE II(a)

M. dobsoni (poovalan) whole to PD

Source of variation	SS	DF	MS	F
Bet: Months	41.1797	7	5.8828	5.19*
Error	145.1897	128	1.1342	
Total	186.3690	135		

TABLE II(b)

M. affinis (kazhandan) whole to PD

Source of variation	SS	DF	MS	F
Bet: Months	67.3202	7	9.6171	6.21*
Error	232.2108	160	1.5480	
Total	299.530	157		

TABLE II(c)

P. stylifera (karikadi) whole to PD

Source of variation	SS	DF	MS	F
Bet: Months	50.9709	7	7.2815	6.59*
Error	131.4775	119	1.1048	
Total	182.4484	126		

TABLE II(d)

P. indicus (sea naran)

Source of variation	SS	DF	MS	F
Bet: Months	27.5710	6	4.5951	1.93
Error	223.8967	94	2.3818	
Total	251.4677	100		

* highly significant

SS sum of squares

DF degrees of freedom

MS mean square

C I confidence interval

from whole to PD was noticed in May. Minimum yield noticed was 45.76% in March. Standard deviation was found to be the lowest during March and the highest during January and February. The shortest confidence interval for the mean yield was observed during March and the longest during April. The percentage yield of *M. affinis* from whole to HL was on an average 60%.

Table I (c) gives the mean, standard deviation and the 95% confidence interval for the percentage yield of *P. stylifera*. For this species a maximum yield of 37.13% was noticed in January and a minimum of 33.57% during March. Comparatively smaller value for standard deviation was observed in February and larger value in December. The narrow confidence belt for mean yield was noticed in February.

Regarding *P. indicus* (Table I-d) the maximum yield of 67.13% was observed during November and minimum yield of 64.83% was observed in January. The mean yield for various months ranged between 64.83% and 67.13%. Standard deviation was found to be minimum during April and maximum during January as could be seen from the table. The shortest confidence interval for the mean yield was observed in April and the longest in January and May. The variability observed in the percentage yield of this species may be attributed to the non-uniformity in the size grade because a part of the *P. indicus*, processed at Cochin was coming from nearby states, which differ in size composition compared to those available locally.

For *P. monodon* no monthwise data were available. For the year under study a total of 29 observations were made and on the basis of this, mean yield worked

out from whole to HL was 67.41% with a standard deviation of 5.38%. The 95% confidence interval worked out for this species was 65.79 to 69.03%.

Table II a, b, c and d give the results of analysis of variance of the mean yield of the 4 species *M. dobsoni*, *M. affinis*, *P. stylifera* and *P. indicus* in different months. It could be seen from these tables that between month variation in the average yield of *M. dobsoni*, *M. affinis* and *P. stylifera* was highly significant ($p \leq .01$). By forming the critical difference at 5% level, the average yield in different months of the said three species was compared. It was observed that the average yield of *M. dobsoni* was significantly high during February and May, the yield of *M. affinis* was significantly high during May and October and the yield of *P. stylifera* in January, February, April, May and December. The variation in the average yield of *P. indicus* was found to be not significant between months. The significantly high yield observed in certain months in the case of *M. dobsoni* and *M. affinis* may be attributed to the fact that they were the months preceding the effective spawning of these species (George, 1970).

Table III (a) gives the monthly yield of *M. dobsoni* and *P. stylifera* from whole to cooked and peeled. Though the species were cooked separately for 3 to 4 minutes, on peeling, the meat were put together so that no monthwise figures were obtained separately for the two species. However, from factory experience, the average yield of *M. dobsoni* converted from whole to cooked and peeled worked out to be 38% and that of *P. stylifera* to be 30%. From Table III (a), it could be seen that the yield on conversion from whole to cooked

TABLE III(a)
Average yield (%) of whole prawns to cooked and peeled.

Month	Average yield
January	35.0
February	35.4
March	35.2
April	35.3
May	35.3
June	33.3
July	32.0
August	30.9
September	31.8
October	32.3
November	30.5
December	34.9

TABLE III(b)
Analysis of Variance of cooked and peeled yield rates

Source of variation	SS	DF	MS	F
Bet: Months	299.9849	11	27.27	8.37
Error	329.1303	101	3.26	
Total	629.1151	112		

and peeled was high in the months December to May.

Table III(b) gives the analysis of variance of the monthly yield. The between months variation was highly significant ($p \leq .01$) and the cooked and peeled yield rate was found to be comparatively lower from June to November than from December to May.

For canning, *M. dobsoni*, *P. stylifera* and small *M. affinis* are generally used. It was observed that under factory conditions the blanched yield of peeled and

deveined *M. dobsoni* was about 45% and that of *P. stylifera* was about 38%. Thus the blanched yield worked out in terms of the net weight of whole prawns used for canning was on an average 19% for *M. dobsoni* and 15.2% for *P. stylifera*.

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