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COMPARISON BETWEEN THE INDICES OF STOMACH FULLNESS OF LIVING AND DISTRESSED SPECIMENS OF BIGEYE TUNA*

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SUMMARY

The study of the stomach contents of living and distressed tunas made it possible to reveal a difference between their indices of fullness. The mean index of stomach fullness for distressed tunas is about 85 percent of the stomach fullness for living tunas. The data obtained can be used for the determination of the rate of digestion in the stomachs of tunas.

RESUME

L'étude du contenu stomacal de thonidés vivants et morts a révélé des différences quant à leur index de réplétion. L'index moyen de réplétion des thonidés morts est environ 82 % de celui des thonidés vivants. Les données obtenues peuvent servir à déterminer le taux de digestion des etomacs de thonidés.

RESUMEN

El estudio del contenido estomacal de túnidos vivos y túnidos con problemas mostraba diferencias de volumen. El índice medio de contenido estomacal en el caso de túnidos con problemas es alrededor del 82% del de los túnidos vivos. Estos datos pueden servir para determinar la tasa de digestión en los estómagos de los túnidos.

*Not to be cited without reference to the author.

INTRODUCTION

In feeding studies of the fish the index of fullness is often referred to as a factor correlating the weight of the fish and the weight of the food mass. Such active predators as tunas stop feeding when having taken the bait, but for some time, while hooked, they are alive and the digestion continues resulting in a certain reduction of the weight of the food mass contained in the stomachs before hooking. The stomachs of the living tunas often contained intact food organisms. In some cases the squids, still mobile, were recorded, and once two alive specimens of the fish of the family Bramidae were found. In the distressed tunas the food is usually considerably digested. An attempt has been made to determine the actual stomach fullness of the tunas at the moment of capture based on the comparison between indices of fullness for the living and distressed tunas with regard for a high rate of digestion.

MATERIALS AND METHODS

The data on the stomach fullness of 104 living and 300 distressed tuna specimens captured with the long-line in the tropical Atlantic in 1971-1972 were used. A nomogram of conversion of food mass weight depending on the fish weight to stomach fullness grade suggested by Chur (1873) was used to calculate the index of the stomach fullness (fig. 1).

RESULTS

To study the rate of food digestion in the fish of varying weight, the tuna specimens were subdivided into 2 groups: one group included the fish with the weight below 60 kg, and the other - the

tunas with the weight over 60 kg. Actually, there is no difference between the weight composition of the living and disrtessed tuna specimens recorded during the investigation period, which is indicative of the reliability of the obtained results (table 1).

Table 2 contains the data on the stomach fullness of the two groups of the bigeye tunas. The analysis of the results showed a lower mean index of the stomach fullness for larger tuna specimens over 60 kg in weight, which evidently is indicative of lower food consumption by these tunas per unit body weight. However the index of stomach fullness for the distressed tunas of both weight groups is approximately the same and constitutes 82% on average of the index of stomach fullness for the living tunas. Therefore, for more precise assessment of the index of stomach fullness for the distressed tunas at the moment of capture, a conversion factor of 1.2 should be used to convert the food mass weight of the distressed tunas to that of the alive tunas. This factor should be taken into account in short-term forecasts of tuna captures by means of the index of stomach fullness and in studying the state of the food basis for tunas, for it has been established that the tuna catches are the largest at the mean values of the index of stomach fullness ranging from 1.5 to 2.3 (Chur, 1973).

The term of life of large hooked tunas, estimated tentatively by Nakamura and Hiyama (1958) as 1.5-2 hours, also allows to judge of the rate of digestion of the food in the stomachs of the tunas.

REFERENCES

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Table 1

Weight composition of living and distressed tunas

Weight, kg	Living		Distressed			
		%		%		%
10	-	-	2	0.7	2	0.5
11-20	3	2.9	8	2.7	11	2.7
21-30	20	19.2	33	11.0	53	13.1
31-40	4	3.8	15	5.0	19	4.7
41-50	13	12.5	53	17.7	66	16.3
51-60	16	15.4	55	18.3	71	17.6
61-70	9	8.6	49	16.3	58	14.4
71-80	13	12.5	40	13.3	53	13.1
81-90	8	7.7	18	6.0	26	6.4
91-100	11	10.6	16	5.3	27	6.7
101-110	3	2.9	8	2.7	11	2.7
111-120	3	2.9	3	1.0	6	1.5
121-130	1	1.0	-	-	1	0.3
Total	104	100.6	300	100.0	404	100.0
Mean weight	60.3		58.2		58.7	

Table 2

Fullness of stomachs of living and distressed tunas from varying weight groups

Grades	60 kg				60 kg					
	living		distressed		living		distressed		living	distressed
		%		%		%		%	%	%
0	-	-	10	6.0	1	2.1	10	7.5	1 1.0	20 6.7
1	10	17.9	50	30.1	18	37.5	55	41.0	28 26.9	105 35.0
2	14	25.0	35	21.1	8	16.7	27	20.2	22 21.1	62 20.7
3	12	21.4	34	20.5	12	25.0	29	21.6	24 23.1	63 21.0
4	20	35.7	37	22.3	9	18.7	13	9.7	29 27.9	50 16.6
	56	100.0	166	100.0	48	100.0	134	100.0	104 100.0	300 100.0
	2.75		2.23		2.21		1.85		2.50	2.06

Fig. 1. Nomogram of conversion of food mass weight to stomach fullness grade.