

COMUNICACIONES

Proximate composition of muscle of cage-raised red drum, *Sciaenops ocellatus* (Pisces: Sciaenidae), in Panama

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**Resumen:** La composición química del músculo de la corvina roja, *Sciaenops ocellatus*, cultivado en jaulas flotantes es comparable a la obtenida en cultivos de estanques de tierra o en el medio marino. La edad o el peso no fueron un factor determinante de la composición química del músculo. Un alimento flotante del 36 % de proteína es adecuado para mantener un relativo buen crecimiento corporal, así como una aceptable calidad de composición química.

**Key words:** Cage-raised, muscle composition, *Sciaenops ocellatus*.

The red drum *Sciaenops ocellatus* (L) is a commercially important Atlantic sciaenid with good potential for aquaculture. Most previous work published on its nutrition has centered on diet development and nutritional requirements (Lin & Arnold 1983, Williams 1985, Daniels & Robinson 1986, Robinson 1987). Little is known about proximate composition values of the species, except for a report comparing pond-raised and wild fish (Jahncke *et al.* 1988). This research assesses the effect of age and weight on the body composition of cage-cultured red drum. Such information is important if cage culture is to be considered as an alternative to pond culture for red drum.

The cage trials were conducted in Reservoir No. 2 at Agromarina de Panama, S.A. located in Aguadulce, Coclé Province, Panama. Fingerlings averaging 35.0 g were stocked at 41-87 fish/m<sup>3</sup> (2,894 total) in December, 1987, in six 9 m<sup>3</sup> cages (Davis *et al.* 1989). The fish were fed once on a daily basis with Zeigler floating feed pellets (4.8 mm). This feed contained 36 % protein, 6 % fat and 6 % fiber and provided 4,000 cal/g of digestible energy. Initially the fish were fed at 10 % of body weight per day and after 23 days feeding rate was changed to 8 % per day. Feeding rate (as

percent of the estimated biomass per day) declined over the course of this study as follows: 7 % after 63 days, 6 % after 89 days, and 4 % after 117 days. The following physical-chemical parameters [biweekly average (range)] were found for Reservoir No. 2 during the study period: temperature, 27.5 °C (26.5-28.4); dissolved oxygen, 3.5 ppm (2.9-4.8); and salinity, 15 ppt (9.0-22.0). All cages were cleaned weekly with soft wired brushes to avoid fouling and fish was not restocked to account for mortalities losses.

Fish sampling was done biweekly after 33 days (63 g) and ending at 131 days (185 g) in April, 1988. Depending upon fish size and relative cage mortality, the whole bodies of two to four individuals per two to six cages (66 fish total) were vacuum-packed, and individually frozen (I.Q.F.) shortly after each sampling. The raw fillets of all individuals from each individual cage were then minced and combined; duplicate samples of the resulting material were taken for each analysis at the Food Quality and Safety Laboratory at Texas A&M University, College Station, Texas. Pooling of samples for proximate analysis was done since samples of fish were random and presumably independent over time and because Hartley's test showed

normal distribution of variances ( $P>0.05$ ) and that the samples were not significantly different among the stocking rates used ( $P>0.05$ ).

Protein, moisture, and ash of the raw fillets were determined by standard AOAC (1984) procedures. Lipid was determined by a chloroform-methanol extraction method (Bligh & Dyer 1959).

Table 1 shows the average proximate composition of muscle of the cage-raised red drum used in this study. Jahncke et al. (1988) reported that the proximate compositions of raw muscle for pond-raised red drum were similar to those of the wild red drum samples. The range for proximate compositions values (weight percent of tissue sample) of wild and pond-cultured red drum (38 % protein feed) reported by Jancke et al. (1988) were as follows: protein, 18.9-20.1; fat, 0.56-2.06; moisture, 78.3-78.9; and ash, 1.04-1.26. Thus, the proximate composition of raw muscle for cage-raised red drum was similar to that reported for pond-raised and wild red drum. Within the period of the 131-day cage study, age or weight of the fish did not affect the proximate composition ( $P>0.05$ ); weight increased significantly ( $P<0.001$ ) with age of fish. At harvest (302 days) fish growth rates and survival averaged about 2 g/day and 50 %, respectively. Feed conversion averaged 4.7 for all six cages at the end of the cage trial.

TABLE 1

Average proximate composition  
(% weight of tissue sample)

| Days | *Wt. | Prot. | Mois. | Ash  | Fat  |
|------|------|-------|-------|------|------|
| 33   | 63   | 17.8  | 77.4  | 1.48 | 0.62 |
| 48   | 76   | 17.1  | 78.5  | 1.36 | 0.49 |
| 61   | 97   | 18.4  | 77.2  | 1.31 | 0.72 |
| 73   | 119  | 16.9  | 77.8  | 1.25 | 0.68 |
| 89   | 137  | 17.7  | 75.0  | 1.36 | 0.92 |
| 103  | 165  | 17.6  | 77.4  | 1.22 | 0.90 |
| 117  | 173  | 17.5  | 78.7  | 1.39 | 0.75 |
| 131  | 185  | 20.6  | 78.2  | 1.25 | 0.60 |

\* Average fish weight in grams.

The proximate composition of cage-raised red drum was comparable to that of pond-raised or wild fish published values. Age or weight could not be identified as a primary factor in determining the red drum proximate

composition ( $P>0.05$ ); weight increased significantly ( $P<0.001$ ) with age of fish. A 36 % protein feed seems adequate for maintaining both good growth and high quality body composition in cage-raised red drum in Panama.

This study supports the view that a 36 % protein diet can be considered to be adequate for maintaining both good growth and quality of body composition (i.e. low fat and high protein) for cage-raised red drum.

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