

Fecundity Indices of an Endangered Indigenous Carp, *Labeo dussumieri* (Val.), of Kerala

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The absolute fecundity of *Labeo dussumieri* (Val.) varied from 66,420 to 2,39,854 eggs in specimens ranging in total length from 294.5 to 437.0 mm. The relative fecundity varied from 91 to 254 ova while the number of ova per gram ovarian weight ranged from 806 to 1791. The coefficient of maturity was found to vary from 13.3 to 26.8 and the gonosomatic index from 11.5 to 35.9. The fecundity of *L. dussumieri* in relation to fish length, fish weight, ovary length and ovary weight are worked out using regression analysis. By comparing the average values of relative fecundity and number of ova per gram ovarian weight of *L. dussumieri* with those of other *Labeo* spp. of India it could be seen that the former produces less number of ova, when compared to the latter.

Labeo dussumieri (Val.) locally known as *Thooli* is an endangered indigenous carp of Central Travancore rivers of Kerala (Kurup & Kuriakose, 1991). Qasim & Qayyum (1963) discussed the importance of study of fish fecundity and its usefulness for fishery biologists, especially in respect of fishery management. No attempt has so far been made to study the fecundity of *L. dussumieri* and its relationship with other variables. Fecundity studies have been carried out in other *Labeo* spp. of India by several workers (Selvaraj *et al.*, 1972; Varghese, 1973; Rao, 1974; Siddiqui *et al.*, 1976; Pathak & Jhingran, 1977).

Materials and Methods

35 adult ripe females of *L. dussumieri* having the maturity stages of V and VI were collected from the gill net landings of the river Pampa from Korethukadavu, Pallikadavu, Neerattupuram and Punnmuda situated at Alleppey and Pathanamthitta districts of Kerala during January 1988 to December 1989. The total length and weight were recorded for each individual to the nearest millimetre and gram, respectively. The specimens were then dissected, the

ovaries were removed, and the length and weight of the ovaries were recorded to the nearest mm and g, respectively. The ovary was preserved in modified Gilson's fluid (Simpson, 1951) for a period of two weeks. For calculating the fecundity, the gravimetric method was adopted wherein number of eggs in the accurately weighed subsamples were counted and the same was multiplied by the total weight of the ovaries using the formula, $F = nG/g$, where F is fecundity, n is number of eggs in subsample, G is total weight of ovary and g is weight of subsample in the same units. The final figures of fecundity were arrived at based on the average of the weights and number of eggs in three subsamples of each ovary. The fecundity (F), thus computed was correlated to several variables such as total length (L) in mm, body weight (W) in g, ovary length (OL) in mm and ovary weight (OW) in g using regression analysis. Fecundity indices such as the number of ova produced per gram body weight (relative fecundity) (Bagenal, 1963), the number of ova present per gram ovarian weight, the ovarian weight as percentage of total fish weight or the coefficient of maturity (Bagenal & Braun, 1978) and the gonosomatic index or the ovarian

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weight in relation to fish weight excluding ovary weight (Somavanshi, 1985) were computed following standard procedures.

Results and Discussion

Average values of fecundity indices of *Labeo dussumieri* are given in Table 1. Relationship of fecundity with total length, body weight, ovary length and ovary weight after log transformation, are represented in Figs. 1-4 along with their respective regression equations. Regression of ovary weight with total length and fish weight respectively are given in Figs. 5 and 6.

Table 1. Average values of fecundity indices in the spawners of *Labeo dussumieri*

Length group, mm	Average fish length, mm	Average fish weight, g	Average ovarian weight, g	No. of specimens examined	No. of ova per g fish weight	per g ovarian weight	Maturity index	Gonosomatic index	Absolute fecundity
290-309	304	415	72.0	3	199	1019	14.0	170	85547
310-329	322	443	83.0	3	203	1126	17.0	21	91035
330-349	348	476	94.0	5	205	1157	19.0	24	99587
350-369	366	610	103.0	8	178	1026	77.0	21	106430
370-389	376	741	118.0	6	108	1267	14.0	16	127035
390-409	400	893	168.0	5	179	1242	19.0	24	159220
410-429	423	916	134.0	2	147	1022	14.0	17	137029
Average	362	642	110.0	3	174	1079	16.0	20	115125

The absolute fecundity varied from 66,420 to 2,39,854 eggs in specimens ranging from 294.5 to 437.0 mm in total length. The curvilinear relationship between fecundity and total length as observed in *L. dussumieri* fully conforms with the findings of Parameswaran *et al.* (1972) Varghese (1973) and Somavanshi (1985). In the present study, the exponential value is slightly lower than the cube of their length which is very much in agreement with the generally accepted view that fecundity is related to the length of fish by a factor closer to the cube (Bagenal, 1957; Varghese 1961). However, exponential values greater than 4 have been reported in the case of fecundity-length relationships of *Labeo boggut* (Selvaraj *et al.*, 1972), *L. bata* (Siddiqui *et al.*, 1976) and *L. Calbasu* (Pathak & Jhingran, 1977). Linear relationships between fecundity and body weight have been reported in *Labeo fimbriatus* by Bhatnagar

(1972), *L. rohita* (Khan & Jhingran, 1975) *L. bata* (Siddiqui *et al.*, 1976) and *L. dero* (Raina & Bali, 1982) and lend support to the present findings. The fecundity is highly correlated with weight than length of the fish. The curvilinear relationship noticed between fecundity and ovary length observed in *L. dussumieri* is very much in agreement with the findings of Simpson (1951) and Somavanshi (1985). It is significant to note that among various parameters studied, fecundity is highly related to ovary weight because the weights of ovaries of fish are mainly influenced by the ova contained in them. The

linear relationship between fecundity and ovary weight as observed in *L. dussumieri* is in full agreement with the available reports (Qasim & Qayyum, 1973; Khan & Jhingran, 1975; Siddiqui *et al.*, 1976).

The coefficient of maturity increased upto 390-409 mm length group, thereafter a decreasing trend was noticed (Table 1). Similar results have been reported by Bagenal (1963) who attributed the same as a manifestation of beginning of aging and the consequent retardation of reproductive capacities. Similarly, gonosomatic values also showed an increasing trend with increasing length and peak value was recorded in the 390-409 mm length group; thereafter a diminishing trend was observed. The absolute fecundity also decreased from 410-429 mm length group onwards. It would thus appear that in *L. dus-*

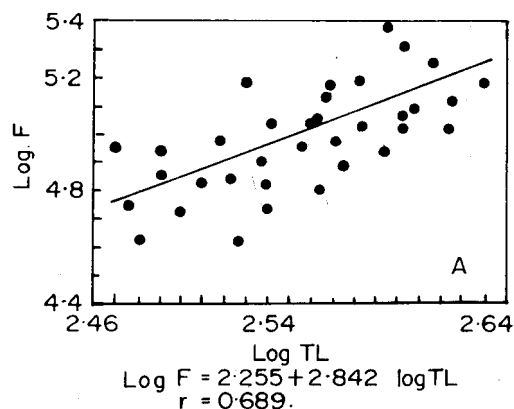


Fig. 1 Relationship between fecundity and total length.

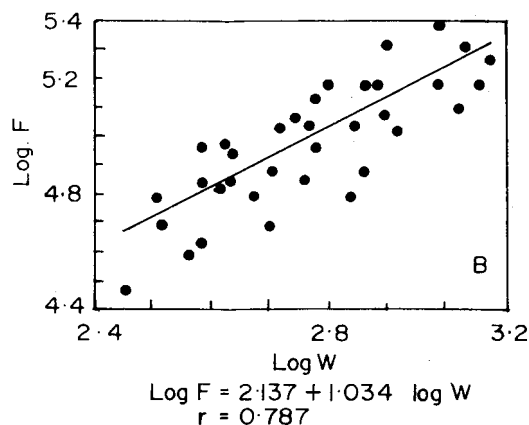


Fig. 2 Relationship between fecundity and body weight.

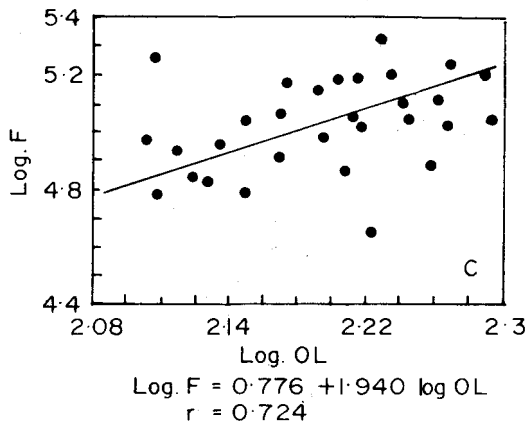


Fig. 3 Relationship between fecundity and ovary length.

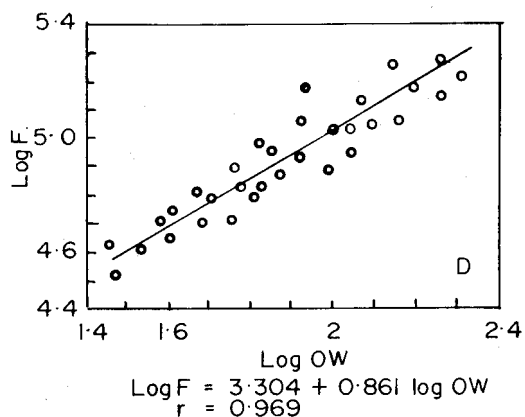


Fig. 4 Relationship between fecundity and ovary weight.

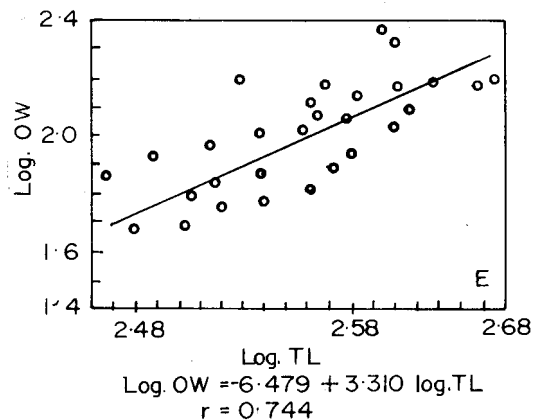


Fig. 5 Relationship between total length of fish and ovary weight.

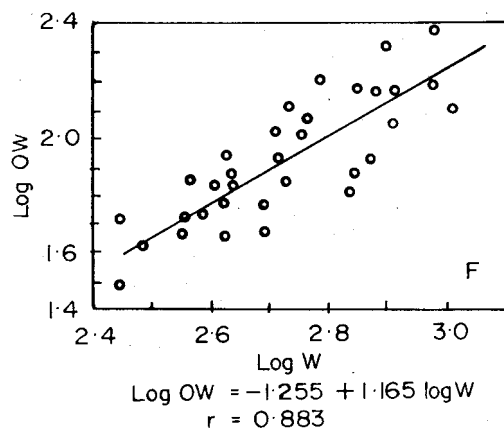


Fig. 6 Relationship between body weight of fish and weight of ovary.

sumieri, the manifestation of aging is not only shown by a change in maturity index but also changes in the relative fecundity, the number of ova per ovarian weight and gonosomatic index. Similar findings were also reported in *Garra mullya* (Somavanshi, 1985).

The present study revealed that the relative fecundity of *L. dussumieri* varied from 91 to 254 with an average number of 180, while the number of ova per gram ovarian weight ranged from 806 to 1791 with an average of 1078. In Rohu, the relative fecundity varied from 121 to 545 with an average of 256, whereas the number of ova per gram ovarian weight ranged from 895 to 2312 with an average of 1156. Pathak & Jhingran (1977) have reported that the relative fecundity of *L. calbasu* of Loni reservoir varied from 169 to 319 with an average of 252 ova. In *L. bata*, the number of ova per gram body weight and per gram ovarian weight was 548 and 1078 respectively (Siddiqui *et al.*, 1976). By comparing the average values of relative fecundity and number of ova per gram ovarian weight of *L. dussumieri* with those of *L. rohita*, *L. calbasu* and *L. bata*, it could be seen that *L. dussumieri* produces less number of ova per gram body weight as well as ovarian weight. It may, therefore, be inferred that the low values of fecundity registered in *L. dussumieri* can manifest as one of the reasons for the depletion of stock in those regions where its availability has been sparse (Kurup, 1990).

References

- Bagenal, T.B. (1957) *J. mar. biol. Ass. U.K.* **36**, 339
- Bagenal, T.B. (1963) *J. mar. biol. Ass. U.K.* **43**, 177
- Bagenal, T.B. & Braun, E. (1978) IPB Handbook No.3, Blackwell Scientific Publications, Oxford, p. 106
- Bhatnagar, G.K. (1972) *J. Inland Fish. Soc. India*, **4**, 26
- Khan, H.A. & Jhingran, V.G. (1975) *FAO Fisheries Synopsis* No. III, FAO, Rome
- Kurup, B.M. (1990) *Population characteristics, bionomics and culture of Labeo dussumieri* (Val.) Annual report No. 2 submitted to Indian Council of Agricultural Research p. 38
- Kurup, B.M. Kuriakose, B. (1991) *Fishing Chimes*, **11** (7), 39
- Parameswaran, S., Alikunhi, K.H. & Sukumaran, K.K. (1972) *Indian J. Fish.* **19** (1&2), 110.
- Pathak, S.C. & Jhingran, A.G. (1977) *J. Inland Fish. Soc. India*, **9**, 72
- Qasim, S.Z. & Qayyum, A. (1973) *Proc. Natl. Inst. Sci. India*, **29**, 373
- Raina, H.S. & Bali, P.S. (1982) *Matsya*, **5**, 70
- Rao, G.R. (1974) *Indian J. Fish.* **21** (2), 427
- Selvaraj, C., Radhakrishnan, S. & Prameswaran S. (1972) *J. Inland Fish. Soc. India*, **4**, 87
- Siddiqui, A.Q., Chattergee, A. & Khan, A.A. (1975) *Aquaculture*, **7**, 181
- Simpson, A.C. (1951) *Fishery Invest. Lond. Ser.* **2**, 17, 1
- Somavanshi, V.S. (1985) *Indian J. Fish.* **33**
- Varghese, T.J. (1961) *Indian J. Fish.* **8**, 96
- Varghese, T.J. (1973) *Proc. Indian Acad. Sci.* **77B** (5), 214